FLORA OF WEST TROPICAL AFRICA

THE *BAOBAB*, ADANSONIA DIGITATA *Linn.*

Price 8s. 6d.

FLORA

OF

WEST TROPICAL AFRICA

THE BRITISH WEST AFRICAN COLONIES, BRITISH CAMEROONS, THE FRENCH AND PORTUGUESE COLONIES SOUTH OF THE TROPIC OF CANCER TO LAKE CHAD, AND FERNANDO PO.

BY

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PREFACE

WHEN the first volume of the "Flora of Tropical Africa" was published in 1868, under the editorship of Prof. D. Oliver, the interest of Great Britain in the economic possibilities of the West African Colonies in respect to the vegetable kingdom was but in its infancy, nor at that early date did we possess a very extensive knowledge of the Tropical African flora. Volumes II and III, published in 1871 and 1877 respectively, which included the Families as far as the end of the *Ebenaceae*, suffered from the same limitations. Since their issue so much new material has been collected in all parts of Tropical Africa, and particularly in the Western Colonies, that these early volumes are now quite out of date, especially in relation to the trees and shrubs, many of which, as for example the West African "Mahoganies," yield timber of great economic importance.

The publication of the "Flora of Tropical Africa" was continued, after an interval of twenty years, under the editorship of Sir W. T. Thiselton-Dyer, when Vol. VII, *Hydrocharideae–Liliaceae*, was published in 1897, and in the Preface to that volume Sir William gives the history of the revival of the undertaking.

Further volumes have been published from time to time since that date, and only the final parts dealing with the rest of the *Gramineae* now remain to be published.

The approaching completion of this great work, only the latter portions of which are now fairly abreast of modern knowledge, has relieved Kew of a great and laborious task and has allowed attention to be directed to the particular needs of our Colonies situated on the western and eastern sides of the African Continent.

The "Flora of Tropical Africa" is so large a work, and covers so wide an area, that it cannot be used for the determination of plants in the field with any facility; it was felt, therefore, that the interests of scientific workers could best be served by the publication of regional floras dealing with some one district and exhibiting a fairly homogeneous floral character.

Our West African Colonies of the Gambia, Sierra Leone, the Gold Coast and Nigeria, including the British sphere of the Cameroons, and the adjacent French and Portuguese possessions, were considered to afford a very suitable region for such a local or regional Flora; the project was, therefore, brought to the notice of the Secretary of State for the Colonies, the history of the present undertaking being given in the following letters:

ROYAL BOTANIC GARDENS, KEW,
November 25th, 1922.

SIR,

FLORA OF TROPICAL AFRICA

In the year 1909 the Secretary of State for the Colonies authorised the employment of an Assistant for Tropical Africa in the Herbarium at Kew, and the appointment was in the first instance for a period of five years, as from 1st April 1909, and was renewed for a further period of three years up to 31st March 1917. . . .

The impending completion of the "Flora of Tropical Africa" induces me to bring to the notice of the Secretary of State a project, which for some years has occupied the attention not only of my predecessors and myself, but of the Governors and Scientific Officers of our West African Colonies, and that is the urgent need of a Handbook dealing with the floras of West Africa, which would form a valuable and most useful work of reference for the Botanical, Forestry and Agricultural Officers in Nigeria, the Gold Coast, Sierra Leone, and the Gambia.

The position of affairs with regard to the Tropical African Flora is closely paralleled by the case of the "Flora of British India," which was also compiled at Kew, under the editorship of Sir Joseph Hooker.

On the completion of that work the need of Floras dealing with special areas was at once realised, and as a result the Government of India arranged for the preparation of the Floras of Bombay, Madras, the Gangetic Plain, etc., which are now either wholly or very nearly completed.

These "local" Floras have been or are being written by distinguished Indian Botanists, and the work has been done almost entirely at Kew, the Government of India finding the necessary funds for the purpose.

I may, perhaps, also refer to the case of the Dictionary of the Economic Products of India by Sir George Watt, Reporter on Economic Products to the Government of India, and to the concise Handbook based upon the Dictionary of the Commercial Products of India which was prepared by him mainly at Kew, as well as to the analogous "Useful Plants of Nigeria" prepared at Kew by one of our Assistants, who had previously served as an official in Nigeria, which has been found of so much value in our West African Colonies as a work of reference dealing with the Economic Products of West Africa.

This latter work, however, useful as it is, is only of full value provided the plants are known and can be easily identified by those who wish to consult it.

The need in West Africa now is a concise and easily workable "Handbook of the Flora" on the lines of one of the Indian Floras, to which I have referred, which could be used by anyone who had a reasonable knowledge of plants—though not necessarily a Botanist by profession. Such a Handbook would provide information as to the plants of value as foods, drugs, fibres, timber, and minor forest products, and would also include the local fodder grasses, which should be easily available for use by veterinary officers.

The "Flora of Tropical Africa," essential though it is for the study of the Tropical African Flora as a whole, is not an easy work of reference in the field owing to its magnitude, and it also suffers in value owing to the fact that since the earlier volumes were written so much new material has come to hand, especially from Nigeria, the Gold Coast and Sierra Leone, that there is a great deal of supplementary matter unavailable to workers in the field, which it is most desirable, in the interests of these Colonies, should be published.

I venture to bring the need of a Flora of West Africa or Upper Guinea to the notice of the Secretary of State at the present moment, partly because the "Flora of Tropical Africa" is so nearly completed, but more especially because I learn that there is an officer available to undertake the preparation of a "local" Flora of exactly the type which would be of the greatest service to our West African Colonies.

The officer to whom I refer is Dr. J. M. Dalziel, M.D., B.Sc., F.L.S., whose Hausa Botanical Dictionary is so well known and has proved of so much value in our West African Colonies. . . .

I beg to request, therefore, that if my proposal should meet with the favourable consideration of the Right Honourable the Secretary of State, the Governors of the West African Colonies may be approached and asked whether they would be prepared to provide the necessary funds for the preparation of the Flora of the West African Colonies on the lines I have indicated.

Since a work of this kind would be of so great value to our West African Colonies I hope the Secretary of State may feel disposed to commend the proposal to their earnest consideration.

I am, etc.,
ARTHUR W. HILL,
Director.

The Under-Secretary of State,
Colonial Office, S.W.1.

DOWNING STREET,
26th January, 1923.

SIR,

I am directed by the Duke of Devonshire to acknowledge the receipt of your letter of the 25th of November relative to the preparation of a Handbook of the Flora of West Africa, and to inform you that copies have been forwarded to the Governors of the West African Colonies for their consideration.

2. A further communication will be addressed to you when their replies have been received.

I am, etc.,
(Sd.) H. J. READ.

The Director,
Royal Botanic Gardens.

DOWNING STREET,
12th June, 1923.

SIR,

With further reference to your letter of the 25th of November I am directed by the Duke of Devonshire to inform you that the replies which he has received to his despatch indicate that the West African Governments agree to your proposal that provision should be made for the compilation of a "Flora of West Africa" by a retired West African officer.

2. His Grace would accordingly be glad if you make the necessary arrangements for this project to be put into effect, and approves of your employing Dr. J. M. Dalziel or any other person who would in your opinion be able satisfactorily to undertake the work. . . .

I am, etc.,
(Sd.) H. J. READ.

The Director,
Royal Botanic Gardens.

On receipt of the Colonial Office letter sanctioning the proposal Dr. J. M. Dalziel was duly appointed Assistant for West Africa at Kew and the work on the "Flora of West Africa" was commenced in September 1923.

Mr. J. Hutchinson, a member of the Kew staff, who has for many years made a special study of the West African flora, was appointed by the Director to take charge of the work and write the Flora in collaboration with Dr. Dalziel.

The combination of a botanist possessing a wide knowledge of the systematic principles of the science with one familiar with the general aspect of the vegetation in the field has proved to be very useful, and it is hoped that the resulting Flora will be found of value by professional botanists, foresters, agriculturists, and by all who take an intelligent interest in the plant life of West Africa.

In due course it is hoped that it will be made possible to provide a similar work dealing with the floras of our Tropical East African Colonies as the second in this series of handy regional Floras.

The present work differs in three important respects from all those of the long series of Colonial Floras which previously have emanated from the Royal Botanic Gardens, Kew.

In the first place it is arranged on a new system of classification; secondly, it is provided with illustrations of the families, as represented by the more important genera, which should considerably enhance its value; and thirdly, the descriptions of the actual plants are reduced to a minimum and the text is mainly in the form of a descriptive "key," in order to facilitate easy and rapid determination of the species.

The system of classification adopted in this Flora is that published by Mr. Hutchinson in his recent book "The Families of Flowering Plants," which, while it follows the main lines of Bentham and Hooker's "Genera Plantarum," differs in some important respects from that classic work, which is the standard of the arrangement in the Kew Herbarium.

The changes involved in the new system seem desirable and worthy of being followed in this Flora, since they embody the results of the new light that recent research has thrown on the inter-relationships of the various Families of the Flowering Plants. The system has also been followed in Burtt Davy's "Flora of the Transvaal," now in course of publication.

The carefully compiled Key to the Families should enable students to determine the position of any particular plant with ease and rapidity, and having ascertained the Family, the brief descriptions drawn up in Key form should enable the genera and species to be determined with equal ease.

The Key principle adopted in this Flora has been found eminently satisfactory in the late Mr. J. S. Gamble's "Flora of Madras" and other Indian regional Floras.

The illustrations with which the Flora is provided have all been prepared specially for the purpose and give all those details which should be of value both to the botanist and the amateur.

Kew is indebted to the numerous botanists, agricultural, forest and medical officers and other Government officials in our West African Colonies for many of the specimens which are recorded in the Flora. Many political officers, amateur botanists and travellers have also enriched our collections, and reference is made to the principal collectors in the opening pages of the Flora, under the heading Botanical Exploration in West Africa.

Kew is particularly indebted to Prof. H. Lecomte, Director, Muséum d'Histoire Naturelle, and to Dr. A. Chevalier, Director, Laboratoire d'agronomie coloniale, Paris, for the loan of specimens, especially from the French Possessions in West Africa, and for the facilities given for the study of the collections in Paris, and to Dr. L. Diels, Director of the Botanic Garden and Museum, Dahlem, Berlin, for the loan of many type specimens.

To these botanists, and to the many others who have generously assisted Kew in supplying specimens and information, I wish to record my sincere thanks, as without their aid the work would have lacked the measure of completeness which it has been possible to achieve.

ARTHUR W. HILL.

ROYAL BOTANIC GARDENS, KEW,
January 1927.

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LIST OF ABBREVIATIONS

Cat. Talb. Nig. Pl. = Catalogue of Talbot's Nigerian Plants (see Bibliography).

Chev. = Aug. Chevalier.

Chev. Bot. = Aug. Chevalier, Exploration Botanique de l'Afrique Occidentale Française (see Bibliography).

Dalz. = J. M. Dalziel.

Exsicc. = from the herbarium specimens of. . . .

F.T.A. = Oliver (later Dyer and Prain), Flora of Tropical Africa.

Guill. and Perr. or *G. and P.* = Guillemin, Perrottet and A. Richard, Florae Senegambiae Tentamen.

Holl. = J. H. Holland, The Useful Plants of Nigeria, Kew Bulletin, Additional Series IX (see Bibliography).

l.c. = loco citato, or in the place cited above.

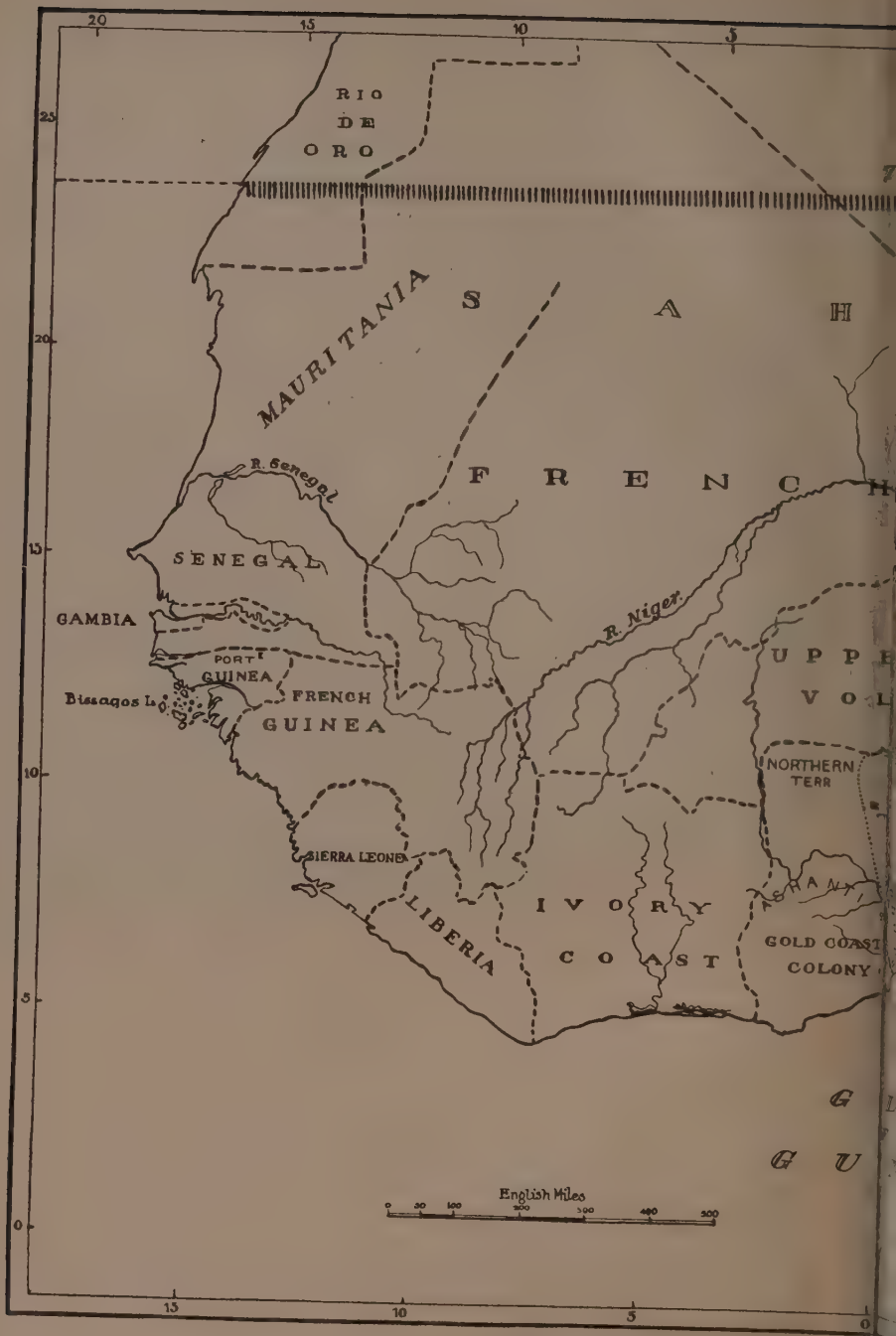
Sc. Elliot = Scott Elliot.

Schum. & Thonn. = Schumacher & Thonning, Beskrivelse af Guineiske Planter (see Bibliography).

Stapf = List of the Known Plants of Liberia, in Johnston, Liberia 2 : Appendix iv.

CITATION OF SPECIMENS

Such specimens as have been generally distributed in herbaria are cited, and in some cases others in order to indicate the exact specimens which we have used for the description of the species. Chevalier's collections are quoted mainly in cases where we possess no other material, or when determinations have been altered from those in his list quoted above. A similar procedure has been followed for Talbot's Catalogue of Nigerian Plants, apart from additional numbers subsequent to that list. After each locality, the month of flowering, when known, has been given in brackets, and a mark of exclamation indicates that we have seen the specimen from the locality quoted.



SKETCH-MAP OF WEST AFRICA, SHOW

REA DEALT WITH IN THIS FLORA.

FLORA OF WEST TROPICAL AFRICA

INTRODUCTION

The chief purpose of this Flora is to render easy the determination in the field of the Flowering Plants of Western Africa. Considerable space has been saved by including only such synonyms as are additional to those in the "Flora of Tropical Africa." For the same reason the original place of publication of each species and synonym has also been omitted. Such would only be available in a large botanical library, and they are readily ascertainable from the *Index Kewensis*. Reference to those species more fully described in the "Flora of Tropical Africa" has been given in each case, and also to valid species described since the publication of that work. In order to keep the systematic part as uniform as possible, native names, uses and economic notes, which are mainly additional to Holland's work (see Bibliography), will form an appendix at the end of the book. Reference to these plants in the text is shown by "See Appendix."

The illustrations have been included mainly for the benefit of the field worker, so that some idea may be gained of each family represented in the area. The drawings have been prepared in every case from West African dried specimens at Kew, and illustrate such species as may be easily procurable and are also fairly widely spread. A few rare plants confined to special localities, such as the Cameroons Mountain, have also been figured, either because they show interesting structural features or because of their phyto-geographical importance.

We are much indebted to Major T. F. Chipp, Assistant Director of the Royal Botanic Gardens, Kew, for placing at our disposal his manuscript of certain woody families, *Anonaceae*, *Dilleniaceae*, *Flacourtiaceae*, and *Rinorea* (*Violaceae*), which he had previously studied for another purpose. We have to thank also Mr. W. E. Trevithick, Temporary Assistant in the Herbarium, for most of the original drawings, in which he has sought with much care and skill to reproduce from the dried specimens the natural appearance of the living plants, and our colleagues Mr. C. H. Wright and Mr. J. E. Dandy for assistance with the proofs.

The area covered by this Flora is roughly that of "Upper Guinea" of the "Flora of Tropical Africa," but excluding that part of Cameroons at present under the mandate of France, and the islands of Annobon, St. Thomas (S. Thomé) and Princes (Principe) Island. It embraces all the region from the Tropic of Cancer in the north to the coast and eastward to the boundary of the French Military Territory in the Lake Chad area (about 15° E.); it also includes the smaller islands off the coast, but not the Cape Verde Islands.

This area is shown on the accompanying sketch-map and is approximately $2\frac{1}{2}$ million square miles, i.e. about 28 times the size of Great Britain or $1\frac{2}{5}$ the area of British India. A considerable proportion of the northern part, however, is desert country and bears only a scanty vegetation. The southern part, except for a coastal strip of grass and savannah, is covered by evergreen forest, which in the Ivory Coast reaches a depth of over 200 miles. Westwards of Liberia this gives place to more open formations, whilst on each side of the Volta River a wedge of the savannah type of vegetation extends right down to the coast. The greatest development of mangrove swamp is found in the

creeks of the Niger Delta, with patches here and there from Gambia to Liberia and at other points where rivers reach the sea by shallow estuaries and lagoons.

The northern edge of the forest belt, at about 6–8° N., is often fairly sharply defined, and is succeeded by high grass or deciduous forest, open woodland and grass savannah, which extends in the western part to a depth of some 400 miles. Beyond the savannah there is a gradual transition to scrub and desert conditions, which are said to be encroaching on the grass and woodland.

The whole area is within the tropics and the greater part of it lies at a comparatively low elevation. Thus an evergreen type of forest often lines the banks of the streams for a considerable distance within the savannah region, and gradation with subtropical and temperate types is not much in evidence. So far as latitude is concerned the Sahara forms a perfect barrier to interchange of tropical and subtropical species, whereas in the matter of altitude any connection with a temperate element is limited, as high mountain ranges are comparatively rare in this part of Africa. The greatest elevation occurs in the south-east corner, where the Cameroons Mountain reaches 13,350 ft., bearing in its upper levels a temperate flora almost identical with that of the high mountains of East Africa. The island of Fernando Po rises in Clarence Peak to 9,348 ft., and its flora resembles very closely that of the Cameroons Mountain. Nowhere else along the coast of Upper Guinea do forest-clad mountains occur near the sea except in the Sierra Leone peninsula, where Sugar Loaf and the adjoining mountains reach an elevation of from 2,000–3,000 ft.

The highest country inland occurs in the western part of the Ivory Coast, about 8° N., where the Nimba Mountains reach an elevation of about 10,000 ft. Here Dr. A. Chevalier[1] has collected some interesting species characteristic of the higher ranges of Central Africa, among them being a *Rubus* and *Cardamine hirsuta*. These mountains form the southern flank of a portion of the ancient plateau of Africa, still existing over a considerable part of French Guinea and culminating in the north in the Futa Jallon highlands. Between this and the Bauchi Plateau in Nigeria (4,000–6,000 ft.), occur small isolated patches of high ground and lesser ranges which appear as abrupt escarpments in the savannah and occasionally in the evergreen forest. These inland mountain areas deserve special investigation, and their botanical exploration would probably yield some very interesting phytogeographical results.

The flora of the forest region shows considerable affinity with that of the great equatorial forest area of Central Africa, with which it is continuous through the Cameroons, and has also many interesting connections with that of Eastern South America. The savannah and semi-desert flora is very similar in all respects to that of the Eastern Sudan. These relationships will form the subject of a special chapter at the close of the work.

The number of species recorded is probably about 5,000, a comparatively small total as compared with some other tropical areas of equal extent. This is mainly due to the general uniformity of the area coupled with its comparatively small range of elevation and depression.

In the citation of the records of species we have used the following sequence of political areas, as shown in pl. 69 of the Times Survey Atlas of the World (1920) :

1, Mauritania. 2, French Sudan[2] (including Upper Volta). 3, Senegal. 4, Gambia. 5, Portuguese Guinea. 6, French Guinea. 7, Sierra Leone. 8, Liberia. 9, Ivory Coast. 10, Gold Coast (including Ashanti and Northern Territories). 11, Togo.[3] 12, Dahomey. 13, Northern Nigeria. 14, Southern Nigeria. 15, Cameroons Mountain. 16, Fernando Po.

[1] A. Chevalier in *Comptes Rendus*, 149 : 458 (1908).

[2] We have followed Chevalier in the use of this term (see Chev. *Sudania*) for the French hinterland, which is included in the Times Atlas (pl. 69) under the general designation of " French West Africa."

[3] The Togo region is now administered jointly under the mandate of France and Britain, but we have found it convenient to retain the name for botanical purposes.

BOTANICAL EXPLORATION IN WEST AFRICA

SENEGAL, GAMBIA, FRENCH GUINEA AND FRENCH SUDAN

Adanson was the first botanist to study the flora of Senegal and the Gambia. He travelled widely in West Africa during the years 1749–54, and among other discoveries we owe to him the first exact account of the Baobab, *Adansonia digitata* (*Bombacaceae*), the tree which forms the subject of the frontispiece of this flora.

Mungo Park's first expedition in 1795–7 extended from the Gambia River to beyond Sansanding on the Upper Niger, and his second ended fatally in the Bussa rapids in Northern Nigeria. A small collection of his plants is at the British Museum, and his name is commemorated in the genus *Parkia* R.Br. (the West African Locust Bean trees, *Mimosaceae*), and in the name of the Shea Butter tree, *Butyrospermum Parkii* Kotschy (*Sapotaceae*).

These were followed by several travellers and doctors, who, though not botanists, made collections of plants which were sent to Paris, and by collectors who were specially sent to West Africa to obtain material.

G. S. Perrottet, as Director of the Agricultural Station, along with M. Leprieur, a dispenser in the French Navy, arrived in 1824. During a residence of five consecutive years they made known the great majority of the indigenous plants of the coastal regions, including the Gambia and Casamance, and of the Lower Senegal River as far as Bakel. The unfinished work "Florae Senegambiae Tentamen," by Guillemin, Perrottet and A. Richard, contains descriptions and figures of many of their plants, a compilation made more complete by the work of Richard himself, gardener at St. Louis, and by Heudelot, who later became Director, as well as by the discoveries of Adanson and others.

Amongst the latter were Durand (Governor of the Colony), Geoffrey and Roussillon (a doctor), who collected towards the end of the 18th century; Dollinger, Bacle and de Beaufort (Naval Officer), all early in the 19th century, and later Dr. Brunner (a Swiss explorer, 1838), Daniell (Surgeon, 1841–53), Jardin (Inspector-General of the French Navy, 1845–8), and others, some of whom were casual collectors of plants, while some were sent for the purpose, such as Sieber. Carrey (Public Works engineer) collected plants in 1880 on the Senegal River between Bakel and Bafoulabé.

The first plants from the Futa Jallon highlands were brought by Dr. Bayol (1881–3), who was followed by Dr. Bellamy (1885), both of whom penetrated from Senegal into French Guinea. The collections of M. Paroisse (of the Paris Museum) between 1893 and 1900 in French Guinea and Sudan include an important one of 200 specimens from Futa Jallon (1893–4). Dr. Miquel (1896–7) also collected in this region, and our knowledge of its flora was extended by the mission in 1887–8 under Dr. Maclaud. The latter again collected in 1895–7, as well as M. Dybowski (1895) in the neighbourhood of Konakry. H. Pobéguin, in his "Essai sur la Flore de la Guinée Française" (Paris, Challamel, 1906), has listed and classified some 1,600 plants collected by himself in that country up to the year 1900.

The first plants to be received from the Middle Niger were a few collected by the Hourst mission, which were sent to Paris in 1898.

Some 17,000 herbarium specimens were collected between 1898 and 1912

by M. Aug. Chevalier and his colleagues from the wider area including Senegal, French Guinea and the hinterland of the Upper Senegal, Volta and Niger Rivers (referred to as French Sudan) and from the Ivory Coast and Dahomey, and these are listed in his "Exploration Botanique de l'Afrique Occidentale Française" (Paris, Lechevallier, 1920).

Other collections at Kew from the Gambia were made by Ingram (about 1866) and Ozanne, and more recently by M. T. Dawe, Commissioner of Lands and Forests (Sierra Leone), and by A. Brooks, Director of Agriculture, the Gambia.

SIERRA LEONE

The earliest botanists of note who studied the Flora of Sierra Leone were H. Smeathmann, Agent-Conductor of the scheme for settling freed slaves at Freetown in 1787, and the Swedish Professor Adam Afzelius, who resided there for several years (from 1792), both of whom made considerable collections. Smeathmann resided mostly in the Banana Islands, and the genus *Smeathmannia* Soland. (*Passifloraceae*) is named after him. J. Matthews, a traveller who published in 1788 his "Voyage to the River Sierra Leone," preceded these botanists in making a collection of plants.

G. Don collected in 1822–3 for the Royal Horticultural Society, and in 1826 Miss Turner sent the remnants of a larger collection made in Sierra Leone, the majority of her plants having perished during the voyage.

The name of Dr. Daniell, who collected both in Sierra Leone and Senegal (1841–53), is retained in the genus *Daniellia* Bennett (*Caesalpiniaceae*) and in *Thaumatococcus Daniellii* Benth. (*Marantaceae*), the "Miraculous Fruit of the Sudan." Dr. R. Clarke, Colonial Surgeon in Sierra Leone and in the Gold Coast (1843–63), contributed material and information regarding economic products.

T. Whitfield (1843–8) collected in Sierra Leone and the interior and in the Gambia. The genus *Whitfieldia* Hook. (*Acanthaceae*) is named after him.

T. Vogel (1841), Barter (1857), Mann (1859) and Dr. (afterwards Sir John) Kirk made collections in Sierra Leone *en route* for other destinations. Mann collected extensively on the Bagroo River.

Winwood Reade made a small collection at Regent in 1868–9. Colonel H. Halcro Johnston, R.A.M.C., sent about 65 plants to Kew in 1883 from the colony.

G. H. Garrett in 1890–1 collected up to 70 miles inland in the north-east of the colony.

G. F. Scott Elliot, Botanist on the Sierra Leone Boundary Commission, made a large collection of 4,000–5,000 specimens during the years 1891–2.

H. N. Thomas (Anthropologist 1913–14) sent abundant herbarium material to Kew from various parts of the colony, and additions from time to time have been made by officers of the Forestry and other Departments, among whom Unwin and Smythe, Lane-Poole, Burbridge, Aylmer, Dawe, and Dalziel deserve special mention.

LIBERIA

The first botanist to visit the Liberian coast was T. Vogel, of the Niger Expedition of 1841, who spent a fortnight in the rainy month of July and collected about 150 species which are at Kew.

P. Schoenlein collected a few specimens in 1855, which were sent to Berlin. Another German, Dr. Naumann, Naturalist to the "Gazelle" expedition, made a small collection at Monrovia in August 1874 which is also at Berlin.

M. Dinklage, formerly Manager of the Woermann factory at Grand Bassa, has collected chiefly in the coastal region since 1898. His collections, which

contain many new species and some new genera, are still proceeding. Many of his duplicates are at Kew.

Material from inland districts was collected in 1903–4 by A. Whyte, formerly Superintendent of the Botanic Garden at Entebbe, Uganda. The locality Kakatown on many of his labels refers to a village about 50 miles behind Monrovia. Here he explored within a radius of 20 miles, and then proceeded up the Sino valley and in the Kroo country to about 80 miles from the coast. His 350 species are at Kew.

Other small collections have been made by D. Sim in the Sino region (1901), by H. Reynolds from the St. Paul River, 30 miles from the coast (1905), and by Sir Harry Johnston (1907). In 1925 a set of 427 Liberian plants, collected by Dr. O. F. Cook in 1895–6, was received for study at Kew from the U.S.A. National Museum.

IVORY COAST

The chief investigation of the flora of the Ivory Coast is of recent date and has been conducted by Aug. Chevalier and his collaborators during the years 1905–10.

Chaper, a mining engineer, brought plants and seeds to the Paris Museum in 1882. The collections of M. Pobéguin (Administrator), made between 1894 and 1897, and those of M. Jolly, who was in charge of the garden at Dabou from 1896 to 1900, are the earlier ones of most importance. The Chevalier botanical explorations have furnished some 5,000 specimens, and in particular established the scientific names and values of the forest trees (Les Végét. Utiles de l'Afr. Trop. Franç., fasc. 5, 1909, " Bois de la Côte d'Ivoire ").

GOLD COAST

The earliest botanical investigations were made by the Rev. John Smyth, Minister to the Royal African Company's Factory at Cape Coast (1697), R. Planer, Surgeon (1699–1703), and J. Skeen, also a Surgeon (1703), who all sent their plants to Petiver, and by G. Bosman, the Dutch voyager, who visited the Guinea coast and Ashanti and described the more remarkable plants in his " Voyage de Guinée " (1704).

George Ogilvie made a collection at Cape Coast Castle about 1780, which he sent to Sir J. Banks ; it is at the British Museum. M. Vahl, a Danish pupil of Linnaeus, explored the Guinea coast in 1782 and collected specimens. These are at Copenhagen and duplicates are preserved in Paris and Geneva ; he himself described some of the plants collected later by Isert, Thonning and others. The genus *Vahlia* Thunb. (*Saxifragaceae*) is named after him.

The Danish botanist Isert carried out explorations from Accra to the Volta and Akwapim, and also in Dahomey (1783–6).

Palisot de Beauvois made small collections on the Gold Coast on his way to Benin in 1786.

Thonning (Councillor of State, Denmark) lived at Accra for three years and collected in that neighbourhood and in Kwahu, Akwapim and the lower Volta. The genus *Thonningia* Vahl (*Balanophoraceae*) is named after him. His own herbarium was destroyed at the bombardment of Copenhagen in 1807 ; some of the duplicates, however, had been sent to the Paris Museum and to other herbaria in Copenhagen, and have been described by F. C. Schumacher in " Beskrivelse af Guineiske Planter " (Copenhagen 1827).

H. Tedlie, who was Assistant Surgeon on Bowdich's Mission to Ashanti in 1817, collected a number of plants, most of which were lost or destroyed, but a few are at the British Museum. The native names and uses of 37 medicinal plants collected by him at Kumasi are given in the published account of the expedition.

T. Vogel collected at Cape Coast and Accra and a very few miles inland on his way to the Niger in 1841.

In 1882–3 Sir A. Moloney sent plants to Kew from the Gold Coast; and in the same year Sir Richard (then Captain) Burton and Commander V. L. Cameron collected 151 specimens in the neighbourhood of Axim. About the same time a collection was made by G. Krause between Gold Coast and Togo.

On the Ashanti Expedition of 1896 Captain H. A. Cummins, Surgeon, collected 200 plants, which included several new species.

T. W. Brown sent 135 Gold Coast plants to Kew in 1900; but the largest collections of this period (1898–1902) were those made by W. H. Johnson, Director of Agriculture, amounting to some 1,100 specimens. More recently a fairly abundant supply of specimens has been received, principally from officers of the Forestry and Agricultural Departments, among whom should be mentioned H. N. Thompson, N. C. McLeod, T. F. Chipp, L. A. King-Church, R. W. Brent, W. H. Patterson, R. H. Bunting, A. W. Miles and F. N. Howes. Dalziel collected 175 species in various districts in 1919–22. A collection of 50 grasses from the Northern Territories was also made in 1924 by Captain Beal, Principal Veterinary Officer.

TOGO AND DAHOMEY

Isert, who travelled in the Gold Coast, also explored in Dahomey (1785) and in the adjoining Territory, afterwards German Togoland.

Père Ménager in 1874 collected some plants on the coast which are preserved at the Paris Museum. A few were also collected by Sir Richard Burton in 1863–4 on his visit to Abomey.

Most of the botanical material from these regions is of comparatively recent date. De Gironcourt collected about 130 specimens in 1908–10 in Upper Dahomey and in the Niger Valley.

In Togo considerable collections have been made by Warnecke in the coast region, and by Baumann, Buettner and Kling, Graf Zech, von Doering, Dr. Kersting, Schroeder, Mellin, Busse and Mildbraed in the inland areas. Duplicates of many of these have been sent to Kew from the Berlin Museum.

NORTHERN NIGERIA

The first Europeans to reach what are now the Northern Provinces of Nigeria were Captain H. Clapperton, Major Denham and Dr. Oudney in 1822–4, who arrived there after crossing the Sahara to Lake Chad. Clapperton again reached Sokoto via Badagri on the Lagos coast in 1825. The plants, collected apparently by Oudney, are at the British Museum, and include 77 species from Bornu and 16 from eastern Hausa. They were described by R. Brown in his Appendix to Denham and Clapperton's "Travels and Discoveries in North and Central Africa," pp. 208–46, with maps.

Theodor Vogel, Chief Botanist to the Niger Expedition of 1841, collected between September 11th and 17th of that year in the neighbourhood of the present Lokoja. His collections, which include some plants from Sierra Leone, Liberia and Gold Coast as well as from the Lower Niger and from Fernando Po, are at Kew and are described in Hooker's "Niger Flora." The Niger collection numbers about 300 species. Vogel was assisted by J. Ansell of the Royal Horticultural Society, after whom is named the genus *Ansellia* Lindl. (*Orchidaceae*).

Dr. Barth, of the Richardson, Barth and Overweg Expedition, during his travels in the north (1849–54), carefully observed the flora but made no collection. Edward Vogel in 1854 crossed the Sahara in search of Barth. He collected in the region of Lake Chad and was eventually assassinated in Wadai.

Of his plants, which were brought to Europe by Barth, 108 specimens are at Kew and another set of 144 at the British Museum.

C. Barter was attached to the Niger Expedition under Dr. Baikie in 1857. His very large collections at Kew (and at Dublin) include material from the Lower Niger, from Epe (called by him Eppah) about 30 miles east of Lagos, and from an area vaguely described as "Nupe," but apparently including the districts adjoining the Niger at Raba, below Jebba, where Dr. Baikie had his headquarters. From here he made excursions to the tributaries and up the river as far as the lower end of the rapids. A considerable collection was also made at Fernando Po, and specimens were no doubt also collected on his return from Lagos via Ilorin to Raba, where he died in July 1859. The genus *Barteria* Hook. f. (*Passifloraceae*) was named after him.

Dr. Baikie was Surgeon and Naturalist and later Commander of the Niger Expedition of 1854, and again in 1857. His first collections up to 1859 seem to have been included with those of Barter. A small collection received in 1862 is referred to "Nupe" and probably includes plants from Lokoja, where Baikie was established as Administrator of the Settlement, and from the country around and up to Bida. The genus *Baikiaea* Benth. (*Caesalpiniaceae*) was named in his honour.

About the same period J. T. Dalton made a collection of grasses at Lokoja (1861), and from the same locality Captain A. J. Richardson in 1898 also made a collection mainly of grasses.

In 1873 G. Rohlfs travelled from the Mediterranean to Lake Chad and thence to the coast, and published an account of the journey ("Quer durch Africa," Leipzig, 1874–5).

In 1901–2 L. Kentish Rankin, Political Officer, sent to Kew 39 specimens from the "southern part of N. Nigeria."

W. R. Elliott, Conservator of Forests (1903–8), made considerable collections representative of a wide area in N. Nigeria up to Lake Chad.

P. A. Talbot and Captain G. B. Gosling collected during a survey expedition in 1904–5 from Ibi to Lake Chad via Bauchi.

Plants collected by Dalziel (1905–12) in various provinces of N. Nigeria number 1,645. The collections of H. V. Lely and those of J. Dent Young, both of the Forestry Department, are of particular value since they have thrown much light on the flora of the Bauchi Plateau, which hitherto was almost unknown.

Many other collectors have contributed material, amongst whom may be mentioned Drs. Parsons and Moiser, Medical Officers, and E. W. Foster, B. G. B. Shaw, J. Bunney and F. D. Ryan, all of the Forestry Department, P. H. Lamb, Assistant Director of Agriculture, C. C. Yates, District Officer, and A. W. Hill.

SOUTHERN NIGERIA

The earliest collection from the Southern Provinces appears to be one made by J. Kirkwood, a Surgeon, who sent plants to Petiver from Old Calabar (and from Angola) about 1698. The first botanical investigator was Palisot de Beauvois, who in 1786–8 explored the kingdoms of Oware (i.e. Warri) and Benin; he also collected on the Gold Coast. His plants are described in the unfinished "Flore d'Owaré et de Benin en Afrique" (Paris, 1804–7), and are to be found at Geneva and Paris. T. Vogel, of the Niger Expedition, 1841, and Barter in 1857–9, collected on the Lower Niger in passing. The Rev. W. C. Thomson collected at Calabar between 1849–65. E. G. Irving, Surgeon, R.N., collected at Abeokuta, where he held a civil appointment in 1854–5. The genus *Irvingia* Hook. f. (*Simarubaceae*) is named after him.

The very important collections made by Gustav Mann, which are at Kew, include much material from Cameroons Mountain and Calabar, as well as some from Sierra Leone. He was sent to the Gulf of Guinea by the Admiralty,

1859–63, while British representative of Fernando Po, St. Thomas and Princes Island, Gabon and Spanish Guinea.

About the same time W. G. Milne, 1862–6, collected chiefly near Calabar and Fernando Po; and Sir Richard (then Captain) Burton, on visits from Fernando Po, sent plants from Abeokuta, Whydah, Abomey, Brass and Bonny, as well as from the Cameroons Mountain and River.

Plants were also collected by Dr. Robb on the Calabar River previous to 1870.

E. Kalbreyer collected for Messrs. Veitch in the Niger Delta and the Cameroons (1877–84). The Rev. Hugh Goldie is remembered by *Pararistolochia Goldieana* Hutch. & J. M. Dalz. (see fig. 22, p. 76), which he discovered in the Calabar district (1888).

Sir Alfred Moloney, Governor of Lagos, who collected during 1883 to 1896, Mr. Alvan Millson, Assistant Colonial Secretary (1890–1), Henry Millen, Curator of the Botanic Garden (1892–6), Dr. J. W. Rowland, Botanist on Sir Gilbert Carter's expedition in 1893, Chief Medical Officer in 1896, and Dawodu, an African Assistant Curator (1899), all sent plants representative of Lagos and the adjoining Yoruba country.

H. W. L. Billington was the first Curator of the Botanic Garden, Old Calabar (1893–7), and was succeeded by J. H. Holland (1897–1901), now Assistant in the Museum, Royal Botanic Gardens, Kew. About 300 specimens collected by the latter are at Kew. C. Punch, the first Superintendent of Forests, sent about 170 plants from Lagos Colony to Kew, 1900–1. His name has been given to one of the species of West African mahogany, *Khaya Punchii* Stapf.

Phillips, a pupil at Lagos, also collected about 70 specimens in the colony, and others were forwarded by the Governor, Sir William MacGregor, and by Sir George Denton.

From 1905 onwards material has accumulated. Many specimens representative of the forest flora have been sent by officers of the Forestry Department, among whom may be mentioned H. N. Thompson, N. C. McLeod, R. E. Dennett, J. H. J. Farquhar, A. H. Unwin, E. W. Foster, L. A. King-Church, H. J. Sankey, J. L. Williams and H. Dodd. Dr. Lamborn, Entomologist, also collected about 70 miles east of Lagos in 1910–11. Dr. Dalziel's collections include about 400 species from Lagos and the vicinity.

Mr. H. N. Thomas, Anthropologist, sent some 1,500–1,600 specimens which he collected in 1911–12 and later, and a collection of S. Nigerian grasses was made by M. B. W. Jeffreys in 1915.

The very important collections of Mr. and Mrs. P. A. Talbot, made between 1909–12, include over 1,000 species and varieties. Nine new genera and 195 new species have been described from this collection by Rendle and Baker in their "Catalogue of Talbot's Nigerian Plants" (British Museum, Natural History, 1913). A further collection was made by Mr. and Mrs. Talbot in the Eket District in 1912–13 (E. G. Baker, in "Journ. of Bot.," 1914: 1, 25). The genera *Talbotia* S. Moore (*Acanthaceae*) and *Talbotiella* Bak.f. (*Caesalpiniaceae*) are named after them.

THE CAMEROONS

The Cameroons Mountain and River were explored to some extent by Gustav Mann (1861–2), and by Richard Burton (1861–4). Mann's collection from the mountain, which they ascended together on one occasion in 1861, numbers over 250 species. G. Thomson, missionary, collected here between 1871–8, and the collector Kalbreyer also worked in this area.

Sir Harry Johnston collected 85 species at Rio del Rey in 1886, and from the upper slopes of the Cameroons Mountain he brought back 150 specimens, including ferns. Dr. A. H. Unwin also collected on the mountain in 1916–17.

Despite these activities, however, much more knowledge of the flora of this highland region of the Cameroons is required.

In the Cameroons as formerly understood much work has been done by German collectors, especially by Preuss, Zenker and Staudt (1897–1902), many of whose duplicates are at Kew and at the British Museum. C. Ledermann made a botanical exploration from Duala to Garua on the Upper Benue and back in 1908–9, partly in the area now administered under Nigeria, and some of the plants collected by Preuss, Zenker, Staudt and Ledermann come from the region covered by this Flora.

FERNANDO PO

The principal collections have been made by Theodor Vogel, who collected about 43 species at Clarence Cove (Santa Isabel), where he died in December 1841, and by Gustav Mann, whose Fernando Po collections (1859–61) include about 750 species, some of them from a high altitude on Clarence Peak.

Captain Richard Burton, who was Consul at Fernando Po from 1861–4, collected some plants in the island, as did also W. G. Milne (1866), Kalbreyer (1877–84), and J. Mildbraed in 1911.

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GLOSSARY OF BOTANICAL TERMS USED IN THIS WORK

abaxial, the side or face away from the axis.
abortion, suppression of parts usually present.
abruptly-pinnate, a pinnate leaf without an odd terminal leaflet, the same as paripinnate (see fig. 4A).
accrescent, increasing in length or thickness, e.g. the calyx of some plants in fruit.
accumbent, lying against, as the cotyledons in some *Cruciferae* with their edges against the radicle.
achene, a small dry fruit, not splitting when ripe, and containing a single seed, as in *Clematis* and *Compositae*.
aciculate, very narrow, stiff, and pointed.
actinomorphic (regular), applied to flowers which may be bisected in more than one vertical plane.
aculeate, armed with prickles as distinct from thorns; *aculeolate*, with small prickles.
acuminate (see fig. 4A).
acute (see fig. 4B).
adaxial, the side or face next the axis.
adnate, united with a member of another body or series, e.g. the ovary and calyx-tube.
adventitious buds, those produced elsewhere than in the axils of the leaves or the extremity of the branch.
aestivation, the manner in which the sepals and petals are arranged in bud.

FIG. 1.—TYPES OF AESTIVATION.
A, contorted.
B, imbricate.
C, valvate.

alternate, applied to leaves, etc., inserted at different levels along the branch as distinct from opposite.
amentiferous, bearing catkins.
amplexicaul, stem-clasping, as when the base of the leaf is dilated and embraces the stem.
anemophilous, wind-pollinated.
anisophyllous, the two leaves of a pair of different size or shape.
anther, the part of the stamen which contains the pollen, usually divided into two sacules or cells.
anticous, in position most remote from the axis.
apiculate, ending abruptly in a short point (see fig. 4C).
appressed, lying close and flat.
aril, an appendage covering or partly enclosing the seed and arising from the funicle (or stalk) of the seed.
arista, with a long, bristle-like point.
articulated, jointed or separating at a certain point, leaving a clean scar.
auricle, a lobe, an ear-like lobe or appendage at the base of a leaf or other organ (see fig. 3E).
awn, a fine bristle terminating an organ (usually applied in the case of the flowers of grasses).
axil, the angle between the leaf and the branch; *axillary*, arising from the axil.
axile, used of the attachment of ovules to the axis or to the inner angle of the cells of a syncarpous ovary (see fig. 7D).
axis, of inflorescence, that part of the stem or branch on which the individual flowers are borne.

axis, of ovary, the central column or the central part where the inner angles of the cells (of which the ovary is composed) meet.
baccate, berry-like.
barbed, with rigid points or short lateral bristles pointing backwards.
barbellate, shortly barbed.
basifixed, of an anther attached by its base.
bearded, with a long awn, or with long or stiff hairs.
berry, a juicy fruit with seeds immersed in pulp.
bifid, cleft into two parts at the tip.
bifoliate, having two leaves ; *bifoliolate*, having two leaflets.
bilabiate, two-lipped, as when two or three lobes of a calyx or corolla stand separate as an upper lip from the others forming a lower lip.
bilocular, with two compartments or cells.
bipinnate, when the primary divisions (pinnae) of a pinnate leaf are themselves pinnate.
bisexual, having both sexes in the same flower or inflorescence.
bract, a small leaf subtending a flower or flower stalk.
bracteoles, small bracts on the pedicel, or close under the flower.
bullate, surface of leaves prominently raised between the veins, as in the Savoy cabbage.
caducous, falling off early.
caespitose, forming mats or spreading tufts.
calyculate, having bracts round the calyx, or an involucre resembling an outer calyx.
calyptra, a cap-like or lid-like covering of certain flowers or fruits (some *Myrtaceae*).

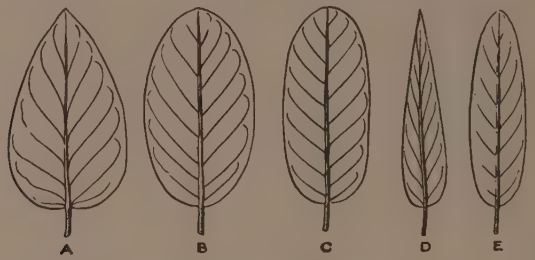

FIG. 2.—SHAPES OF LEAVES.

A, ovate. B, elliptic. C, oblong. D, lanceolate. E, oblong-lanceolate.

calyx, the outer envelope of the flower, consisting of sepals free or united ; *calyx-tube*, when the sepals are partly united the lower portion is the tube and the upper free part is the *limb* usually divided into *calyx-teeth*, *-lobes* or *-segments*.
campanulate, bell-shaped.
canescent, more or less grey or hoary.
capitate, (1) like the head of a pin as the stigma of some flowers ; (2) collected into compact head-like clusters (as the flowers of *Compositae*).
capsule, a dry fruit composed of two or more united carpels, and either splitting when ripe into pieces called valves, or opening by slits or pores.
carpel, a simple pistil formed of a fruit-leaf folded lengthwise and united by its edges, or one of several such united to form a syncarpous ovary.
carpophore, a prolongation of the torus bearing the carpels or ovary (as in *Ranunculaceae*).
caruncle, an outgrowth near the hilum of a seed.
catkin, a close bracteate often pendulous spike.
caudate, abruptly ending in a long tail-like tip or appendage (see fig. 41).
caudicle, in orchids a stalk connecting the pollen-masses.
cauline, arising from or inserted on the stem ; *cauliflorous*, producing flowers from the old wood separate from the leaves.
cell, (1) the cavity or cavities of an ovary or fruit containing the ovules or seeds ; (2) the pollen-sac of an anther, an anther-lobe.
ciliate, with a fringe of hairs along the edge ; *ciliolate*, minutely ciliate.
circinate, inwardly coiled upon itself, as the leaves of *Drosera*.
circumscissile, when a capsule opens as if cut circularly around, the upper part coming off like a lid.
clavate, club-shaped, or thickened towards the end.
claw, the narrow part of a petal, etc.
cleistogamous, when fertilisation occurs within the unopened flower (as in *Viola*).
coccus, a separate part of a lobed capsule (*Euphorbiaceae*).

column, (1) in orchids the adnate stamens and styles forming a solid central body; (2) the tube of connate filaments (as in *Malvaceae*, etc.).
coma, a tuft of hairs at the end of some seeds.
commissure, the faces of cohering carpels (*Umbelliferae*).
compound, the opposite of simple; composed of several similar parts, as a leaf of several leaflets; *compound fruit*, when the fruits of separate flowers become united into a mass, as in *Morinda* (*Rubiaceae*); *compound umbel*, where each ray again bears an umbel.
compressed, flattened lengthwise from side to side (*laterally*), or from front to back (*dorsally*).
conduplicate, folded together lengthwise.
connate, when parts of the same series are united so closely that they cannot be separated without tearing.
connective, the part of an anther which connects its two lobes or cells.
connivent, when parts converge so as to be nearer together above than below.
contorted, of sepals or petals in the bud when each overlaps an adjoining one on one side, and is overlapped by the other adjoining one on the other side (see fig. 1A).
cordate, applied to the base of a leaf when it is more or less deeply notched (see fig. 3B).
coriaceous, firm, tough, of the consistence of leather.
corm, a kind of solid bulb or tuberous bulb-like root-stock.

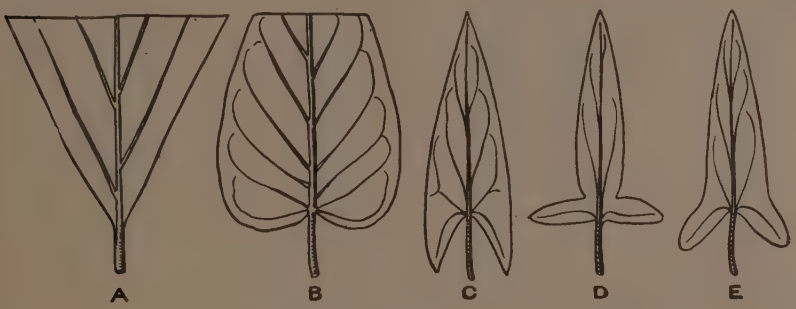

FIG. 3.—BASES OF LEAVES.
A, cuneate. B, cordate. C, sagittate. D, hastate. E, auriculate.

corolla, the inner envelope of the flower, consisting of petals free or united.
corona, a circle of appendages between the corolla and stamens, often united in a ring or crown (as in *Passifloraceae* and *Asclepiadaceae*).
corymb, a more or less flat-topped inflorescence in which the branches or pedicels start from different points but all reach to about the same level.
cotyledon, seed-leaf.
crenate, the margin notched with regular blunt or rounded teeth; *crenulate*, crenate with very small teeth (see fig. 5C).
culm, the stem of sedges and grasses.
cuneate, of the base of a leaf when tapering gradually, i.e. wedge-shaped (fig. 3A).
cuspidate, abruptly tipped with a sharp rigid point (see fig. 4I).
cyme, an inflorescence in which the central flower opens first (centrifugal), and the first branches at least are usually forked or opposite.
deciduous, falling off eventually; not evergreen.
declinate, bent or curved downwards or forwards.
decurrent, when the edges of the leaf are continued down the stem as raised lines or narrow wings.
dehiscent, opening spontaneously when ripe, as capsules and anthers.
deltoid, shaped like an equal-sided triangle.
dentate, the margin prominently toothed, the teeth directed outwards (see fig. 5E).
denticulate, finely toothed.
depressed, more or less flattened from above downwards or at least at the top.
diadelphous, in two bundles.
dichotomous, forking regularly into two.
didymous, of anthers distinctly two-lobed, but with almost no connective.
didynamous, in two pairs of unequal length.
digitate, a compound leaf whose leaflets diverge from the same point (the apex of the petiole), like the fingers of a hand (*Bombax*) (see fig. 6C).
dimorphic, of two forms.

dioecious, with unisexual flowers, the male flowers on one individual and the female flowers on another.
discoid, (1) like a disk or plate ; (2) applied to heads of *Compositae* without ray-flowers.
disk, (1) an enlargement of the receptacle within the calyx or within the corolla or stamens, usually in the form of a ring, cup, or cushion, often lobed or even cut up into so-called *glands* ; (2) the central flowers as compared with the ray-flowers in a head of the *Compositae*.
dissepiment, a partition in an ovary or fruit.
distal, farther from the place of attachment, the converse of *proximal*.

FIG. 4.—DESCRIPTION OF LEAF-TIPS.
A, acuminate. B, acute. C, obtuse. D, truncate. E, retuse. F, emarginate. G, apiculate. H, mucronate. I, caudate or cuspidate.

distichous, regularly arranged one above another in two opposite rows, one on each side of the stem.
divaricate, extremely divergent, or spreading in different directions.
dorsal, of a carpel, the back, or the face turned away from the axis; *dorsal suture*, see *suture*.
dorsifixed, of an anther attached by its back to the filament.
drupe, a stone-fruit such as plum, cherry, etc. (*Flacourtia*, *Ximenia*).
echinate, covered with prickles like a hedgehog.
ellipsoid, an elliptic solid ; *elliptic* (see fig. 2B).
emarginate, notched at the extremity (see fig. 4F).
embryo, the rudimentary plant still enclosed in the seed, consisting of the radicle from the end of which the root will develop, the cotyledons (one, two, rarely more), which become the earliest leaves, and the *plumule*, the bud from which the stem and more leaves develop.
endemic, confined to a region or country and not native anywhere else.
endocarp, the innermost layer of the pericarp.
endosperm, the nutritive material (mealy, oily, fleshy, or horny) stored within the seed, and often surrounding the embryo (formerly called *albumen*).
entire, with an even margin without teeth, lobes, etc. (see fig. 5A).
epicalyx, an involucre of bracts below the flower resembling an extra calyx, e.g. some *Malvaceae*.
epigynous, when the sepals, petals, and stamens are apparently above the ovary (see fig. 8C).
epipetalous, on the petals.
epiphyte, a plant which grows on another plant but without deriving nourishment from it, i.e. not parasitic, as some ferns and orchids growing on trees.
exocarp, the outer layer of the pericarp (of fruit).
exserted, projecting beyond, as the stamens from the tube of the corolla.
exstipulate, without stipules.
extra-axillary, beyond or outside of the axil ; *extra-floral*, away from the flower.
extrorse, of an anther which opens outwardly towards the circumference of the flower.
falcate, curved like a scythe.
farinose, covered with a meal-like powder.
fascicle, a cluster of flowers, leaves, etc., arising from about the same point.
ferruginous, rust-coloured.
filament, the stalk of a stamen supporting the anther.
filiform, slender, thread-like.
flexuose (*flexuous*), zig-zag, or bent alternately in opposite directions.
floccose, covered with woolly hairs.
foliaceous, leaf-like.

follicle, a pod consisting of a single carpel opening usually only along the inner (i.e. ventral) suture to which the seeds are attached.
free, neither adhering nor united ; *free-basal placenta*, one in which the ovules are attached to a central column arising from the base of the ovary-cavity and not reaching the top, e.g. *Primulaceae* (see fig. 7F) ; *free-central placenta*, the same, but reaching to the top of the ovary, e.g. most *Caryophyllaceae* (see fig. 7E).
frutescent or *fruticose*, having the characters of a shrub.
fugacious, falling off early.
funicle, the little cord which attaches the ovule to the placenta.
fusiform, spindle-shaped, thick but tapering towards each end.
gamopetalous, when the petals are united either entirely or at the base into a tube, cup, or ring.
gamophyllous, when the perianth-leaves are united.
gamosepalous, when the sepals are united.
geniculate, bent like a knee.
geophilous, on or from the ground.
gibbous, slightly pouched.
glabrous, devoid of hairs ; *glabrescent*, becoming glabrous or nearly so.
gland, (1) a secreting structure on the surface or embedded in the substance of a leaf, flower, etc., or raised on a small stalk (*glandular hairs* or *stipitate glands*) ; (2) a

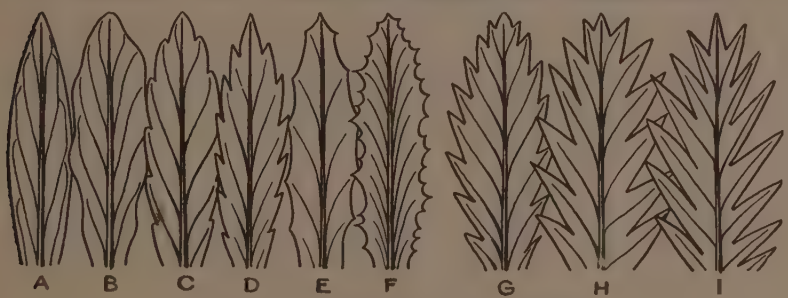

FIG. 5.—DESCRIPTION OF LEAF-MARGINS.
A, entire. B, undulate. C, crenate. D, serrate. E, dentate. F, doubly dentate. G, pinnatifid. H, pinnatilobed. I, pinnatipartite.

warty protuberance or fleshy excrescence (often on petiole, inflorescence, or within the flower).
glaucous, a pale bluish green, or with a pale bloom.
glomerate, compactly clustered.
glomerule, a small compact cluster.
glumes, lower two empty bracts, usually chaffy, as in the spikelets of Grasses.
gynaecium (pistil), the female part of the flower, consisting when complete of ovaries, styles, and stigmas.
gynobasic, when the style arises apparently from the base of the ovary (as in *Boraginaceae* and *Labiatae*).
gynophore, a stalk supporting the gynaecium and formed by an elongation of the receptacle.
hastate, of the base of a leaf when it has two more or less triangular lobes diverging laterally (see fig. 3D).
hermaphrodite, having stamens and pistil in the same flower.
heterocarpous, carpels of more than one kind.
heterogamous, when a flower-head, as in some *Compositae*, has two kinds of flowers, those of the ray being neuter or unisexual, and those of the disk hermaphrodite.
hilum, the scar left on the seed where it was attached to the funicle or placenta.
hirsute, pubescent with rather coarse, stiff hairs.
hispid, bristly-pubescent.
homogamous, when a flower-head has all the flowers of the same kind.
hyaline, almost transparent.
hypogynous, petals and stamens inserted on the receptacle below the ovary and free from it, the ovary being thus *superior* (see fig. 8A).
imbricate, (1) overlapping like tiles ; (2) in a flower-bud when one sepal or petal is wholly internal and one wholly external and the others overlapping at the edge only (see fig. 1B).
imparipinnate, pinnate with an odd terminal leaflet (see fig. 6B).
incised, cut rather deeply.

incumbent, lying on, as the cotyledons (in some *Cruciferae*) with the radicle against the surface.
indefinite, numerous (of stamens, etc.).
indehiscent, not opening when ripe.
indumentum, any covering, such as hairs, wool, scales, etc.
induplicate, the margins (of petals or sepals) folded inwards but not overlapping.
indusium, a cup covering the stigma, as in *Goodeniaceae*.
inferior, of a calyx which is below the ovary, the latter being then superior ; of an ovary which appears to be below the calyx, the latter being adherent to the ovary and superior.
inflorescence, the arrangement of the flowers on a plant ; *infructescence*, the inflorescence in the fruiting stage.
internode, the portion of stem between two nodes.
interpetiolar, of stipules placed between the petioles of opposite leaves (often connate).
intrapetiolar, between the petiole and the stem.
introrse, of an anther when it opens by a slit facing the centre of the flower.
involucre, a number of bracts surrounding the base of a flower-head or of an umbel ; *involucel*, the involucre of a partial umbel.
involute, when the edges of the leaves are rolled inwards.
irregular flowers, those in which the parts of the calyx or corolla are dissimilar in size or

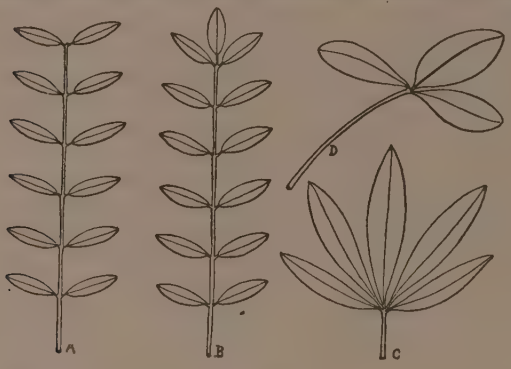

FIG. 6.—COMPOUND LEAVES.
A, paripinnate.
B, imparipinnate.
C, digitate.
D, trifoliolate.

shape, including (1) *asymmetric* flowers which cannot be divided into two equal halves in any vertical plane, and (2) *zygomorphic* flowers which are bilaterally symmetric and may be bisected in only one vertical plane.
keel, the two partially united lowest (or anterior) petals of a papilionaceous flower.
keeled, ridged along the middle of a flat or convex surface.
labellum, the lowest petal of an orchid, usually enlarged and different in form from the two lateral ones.
laciniate, cut into slender lobes.
lanceolate (see fig. 2D).
legume, the fruit-pod of the order *Leguminosae*, consisting of a single carpel, usually opening round the margin along both sutures into two halves.
lenticels, corky spots on the bark.
lepidote, clothed with scales.
ligulate, strap-shaped, used of the ray-florets in many *Compositae*.
ligule, (1) the thin membranous appendage at the top of the leaf-sheath of grasses ; (2) the limb of ray-flowers in *Compositae*.
limb, the upper usually expanded part of the calyx, or corolla, which is united into a cup or tube below.
linear, long and narrow with parallel edges.
lip, (1) one of the two divisions of a gamosepalous calyx or a gamopetalous corolla when it is cleft into an upper (posterior) and a lower (anterior) portion (see under *bilabiate*) ; (2) of an orchid (see *labellum*).
locellate, divided into small secondary compartments.
locular, having cavities or compartments, thus : *unilocular*, one-celled ; *bilocular*, two-celled.
loculicidal, opening into the cells, when a ripe capsule splits along the back (i.e. along the midrib or dorsal suture and not at the line of junction) of the carpels, e.g. in most *Liliaceae*.
lorate, or *loriform*, strap-shaped.

lyrate, of a leaf which is pinnately lobed or cut into small segments below, but with a much larger terminal lobe.
mericarp, one of the separate halves or parts of a fruit (*Umbelliferae*, etc.).
mesocarp, when the walls of a pericarp consist of three different layers, the middle one is the mesocarp ; it is often fleshy or succulent.
micropyle, a minute opening in the ovule through which the pollen-tube enters.
monadelphous, in one bundle (stamens in *Malvaceae*).
moniliform, necklace-shaped, like a string of beads.
monochlamydeous, of a flower having one whorl of perianth, i.e. calyx.
monocotyledon, a plant having a single cotyledon, or seed-leaf.
monoecious, when the male and female flowers are separate, but borne on the same individual plant.
mucronate, ending abruptly in a short stiff point (see fig. 4H).
muricate, rough, with short hard tubercles or pointed protuberances.
nerves, the principal or more conspicuous ribs of a leaf which start from the midrib and diverge or branch throughout the blade ; the smaller branches are veins ; *nervose*, with prominent nerves.
net-veined, when the smaller veins are connected like the meshes of a net (= *reticulate*).
node, the point on the stem or branch at which a leaf or branch is borne.

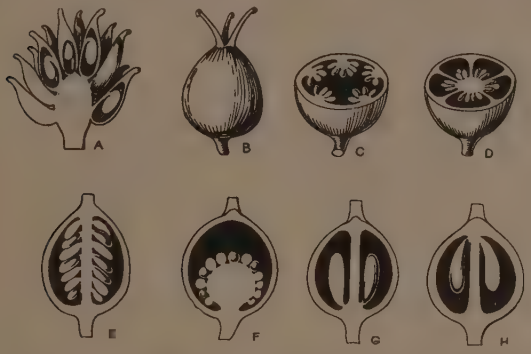

FIG. 7.
A, apocarpous pistil.
B, syncarpous pistil.
C, parietal placentation.
D, axile placentation.
E, free-central placentation.
F, free-basal placentation.
G, basal erect ovules.
H, apical pendulous ovules.

nut, properly a one-seeded indehiscent fruit, with a hard, dry pericarp (the shell).
nutlet, a little nut.
obcordate, more or less heart-shaped, but with the narrow end below and the broad end deeply notched.
oblanceolate, reverse of lanceolate (see fig. 2D).
oblique, of a leaf when the two sides of the blade are unequal at the base.
oblong (see fig. 2C).
obovate, ovate with the broadest part above.
obtuse, blunt or rounded at the end (see fig. 4C).
ochreate, with an *ochrea*, i.e. a tubular stipule sheathing the stem (e.g. in *Polygonum*, see fig. 44).
opposite, (1) of leaves or branches when two are borne at the same node on opposite sides of the stem ; (2) of other organs, e.g. stamens, when opposite or placed in front of the petals instead of alternating with them.
orbicular, flat with a more or less circular outline.
oval, broadly elliptic.
ovary, that part of the pistil (the usually enlarged base) which contains the ovules and eventually becomes the fruit.
ovate, egg-shaped, of a flat surface which is scarcely twice as long as broad, with the broader end below the middle (see fig. 2A).
ovule, the immature seed in the ovary before fertilisation.
pale, or *palea*, (1) one of the chaffy scales or thin colourless bracts amongst the flowers on the receptacle (*Compositae*) ; (2) of grasses, the inner of two bracts or glumes enclosing the flower.
palmate, divided into segments like the palm of the hand.
panicle, an inflorescence in which the axis is divided into branches bearing several flowers.
papilionaceous, applied to flowers of the pea-flower shape.
papillose, covered with minute, nipple-like protuberances.
pappus, applied to the ring of hairs or scales round the top of the fruit of *Compositae* and representing the calyx-limb.

parietal placentation, when the ovules are attached to the inner surface of the wall of a one-celled syncarpous ovary (see fig. 7C).
paripinnate (see abruptly pinnate and fig. 6A).
partite, cleft nearly but not quite to the base.
pectinate, like a comb.
pedate, resembling *palmate*, but the side-lobes further divided.
pedicel, the stalk of each individual flower of an inflorescence.
peduncle, the general name for a flower-stalk bearing either a solitary flower or a cluster, or the common stalk (rhachis, or axis) of several pedicellate or sessile flowers.
pellucid, translucent.
peltate, of a leaf of which the stalk is attached to its under-surface instead of to its edge.
pendulous ovule, an ovule hanging down (see fig. 7H).
penicillate, with a tuft of hairs at the end.
perfoliate, when the stem apparently passes through the blade of a leaf.
perianth, the floral envelopes, consisting of calyx or corolla or both.
pericarp, the wall of the ripened ovary ; its layers may be fused into one, or more or less divisible into epicarp, mesocarp and endocarp.
perigynous, when the sepals, petals and stamens are carried up around the ovary, but not attached to it (see fig. 8B).
perulate, of buds covered with scales.
petiole, the stalk of a leaf ; *petiolule*, the stalk of a leafiet.
phyllode, a flattened petiole or leaf-rhachis taking on the form and functions of a leaf.

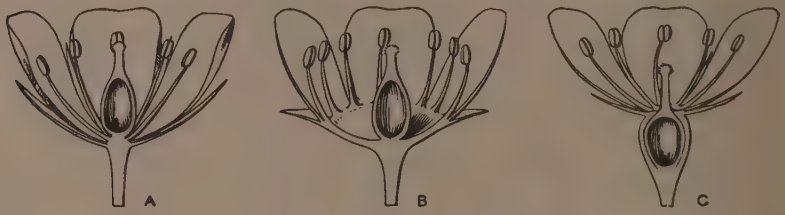

FIG. 8.—TYPES OF FLOWERS.

A, hypogynous, i.e. ovary superior : sepals, petals and stamens *below* the ovary. B, perigynous, i.e. ovary superior ; sepals, petals and stamens *around* the ovary. C, epigynous, i.e. ovary inferior ; sepals, petals and stamens *above* the ovary.

pilose, hairy with rather long simple hairs.
pinna, a primary division of a pinnate leaf ; *pinnate*, of a compound leaf with the leaflets arranged along each side of a common rhachis.
pinnatifid, with the margin pinnately cleft (see fig. 5G).
pinnatilobed, pinnately divided to about half-way to the midrib (see fig. 5H).
pinnatipartite, pinnately divided almost to the midrib (see fig. 5 I).
pinnule, the secondary or tertiary division of a leaf which is twice or thrice pinnate.
pistil, see *gynaecium*.
placenta, the part of the ovary, sometimes but not always thickened or raised, to which the ovules are attached.
plicate, folded like a fan.
plumose, feathered, as bristles which have fine hairs on each side, e.g. the pappus of some thistles.
pod, a dry dehiscent fruit, including (1) a *legume*, formed of a single carpel (*Leguminosae*), and (2) a *siliqua* which is two-celled, divided by a thin partition (*Cruciferae*).
pollen-mass, pollen-grains cohering into a single body.
polygamous, when a species has male, female and hermaphrodite flowers on the same or on different individuals.
polypetalous, of flowers with petals free from each other.
posticous, in position nearest to the axis.
prickle, a sharp outgrowth from the bark, detachable without tearing the wood.
proliferous, bearing adventitious buds on the leaves or in the flowers, such buds being capable of rooting and forming separate plants.
proterandrous, when the anthers ripen before the stigmas.
proterogynous, when the stigmas are receptive before the anthers open.
proximal, nearer to the place of attachment, the converse of *distal*.
pruinose, covered with a frost-like powder or bloom.
puberulous, shortly pubescent.

pubescent, covered with short soft hairs.
pulverulent, as if dashed with powder.
punctate, marked with dots or translucent glands.
pungent, ending in a rigid sharp point.
pustulate, having slight elevations like pimples or blisters.
raceme, an inflorescence in which the flowers are borne on pedicels along an individual axis or peduncle.
radiate, of flower heads of *Compositae* with ray-flowers.
radical, of leaves which arise so close to the base of the stem as to appear to proceed from the root.
radicle (see embryo).
raphides, mineral substances in the form of needle-shaped crystals, within the cells of plants.
ray, (1) all the florets of the margin of a flower of the *Compositae* when different from those of the centre, or disk ; (2) one of the radiating branches of an umbel.
receptacle (or *torus*), the extremity of the peduncle or pedicel on which the parts of the flower, sepals, petals, stamens and pistil are inserted.
regular (see *actinomorphic*).
reniform, kidney-shaped.
repand, when the margin is uneven or wavy, with shallow undulations; not so deep as *sinuate*.
reticulate, net-veined, when the smallest veins of a leaf are connected together like the meshes of a net.
retrorse, bent abruptly backwards.
retuse, notched (see fig. 4E).
revolute, of leaves having the margins rolled backwards towards the midrib.
rhachis, (1) the principal axis of an inflorescence ; (2) the common petiole on which the leaflets of a compound leaf are inserted ; *rhachilla*, the rhachis of the spikelet in grasses and sedges.
rhizome, a root-stock or root-like stem prostrate on or under the ground, sending rootlets downwards and branches, leaves or flowering shoots upwards ; always distinguished from a true root by the presence of buds, leaves or scales.
rostellum, in orchids a projection of the upper edge of the stigma in front of the anthers.
rostrate, beaked.
rosulate, when the leaves are in a circle at the base of the stem.
rotate, wheel-shaped, of a corolla with a very short tube and spreading limb.
rufous, reddish (of various shades).
rugose, wrinkled.
ruminate, of endosperm marked by transverse lines or divisions due to infolding of the inner layer of the seed-coat into the paler endosperm causing a marbled or mottled appearance (e.g. *Anonaceae*, *Myristicaceae*).
runcinate, pinnatifid with the lobes pointing towards the base.
saccate, pouched.
sagittate, of the base of a leaf with two acute straight lobes directed downwards (fig. 3C).
samara, an indehiscent one-seeded fruit provided with a wing (e.g. *Securidaca*, *Malpighiaceae*).
sarmentose, with long whip-like branches.
scabrid, rough to the touch, usually from the presence of very short harsh hairs.
scales, (1) reduced leaves, usually sessile and scarious and seldom green ; (2) a kind of indumentum in the form of small, flat disks attached by the centre.
scape, a leafless flower-stalk arising from the ground.
scarious, thin and dry, not green.
scorpioid, when the main axis of an inflorescence is coiled in bud, the flowers being usually two-ranked, i.e. single flowers alternately right and left.
secund, when parts or organs (branches, leaves or flowers) are all directed to one side.
segment, a part or division of an organ.
septate, divided by one or more partitions.
septicidal, when a ripe capsule splits along the lines of junction of the carpels (i.e. the lines of the placentas or dissepiments), each carpel then itself usually splitting down its ventral suture.
serrate, toothed like a saw, with regular pointed teeth (see fig. 5E).
serrulate, serrate with minute teeth.
sessile, without a stalk.
seta, a bristle, or stiff hair.
setose, beset with bristles.
setulose, a diminutive of setose.
sheath, in grasses the lower portion of the leaf clasping the stem.
siliqua, a pod divided into two cells by a thin partition, opening by two valves which

fall away from a frame on which the seeds are borne (e.g. *Cruciferae*); *silicule*, a short siliqua, not much longer than broad.

simple, the opposite of compound; *simple leaf*, of one blade, not divided into leaflets; *simple fruit*, one which results from the ripening of a single carpel or ovary.

sinuate, when the margin is uneven, with rather deep undulations.

sinus, (1) recess between the teeth or lobes on a margin; (2) angle formed by the basal lobes of a leaf.

spadix, a flower spike with a fleshy or thickened axis (e.g. *Aroideae* and some Palms).

spathe, a large bract enclosing a spadix, or two or more bracts enclosing a flower-cluster.

spathulate, spoon-shaped, broadly rounded above and long and narrow below.

spike, an inflorescence with the flowers sessile along a simple undivided axis or rhachis; *spicate*, arranged in a spike.

spikelet, in grasses a small spike composed of one or more flowers within a common pair of glumes.

spur, a slender usually hollow extension of some part of the flower.

staminode, an abortive or rudimentary stamen without a perfect anther.

standard, the large posterior petal (outside in the bud) of a papilionaceous corolla.

stellate hairs, hairs with several arms radiating horizontally.

stigma, the point or surface of the pistil which receives the pollen, either sessile (when there is no style) or on the top or surface of the style or its branches.

stipe, the stalk supporting a carpel or gynaecium.

stipellae, two small secondary stipules at the base of a leaflet.

stipitate, supported on a special stalk, or stipe, as an ovary (e.g. *Capparidaceae*).

stipules, leaf-like or scale-like appendages of a leaf, usually at the base of the petiole.

stolon, a runner which roots.

stoma (pl. *stomata*), breathing pores in the epidermis.

striate, marked with parallel longitudinal lines, grooves or ridges.

strigose, with short stiff hairs lying close along the surface.

strobile, a spike covered with imbricate bracts.

strophiole, an appendage to the hilum of some seeds.

style, the narrow upper part of the ovary supporting the stigma.

sub, a prefix implying somewhat or slightly, e.g. *subacute*, somewhat acute, *subentire*, having a very slightly uneven margin.

subulate, awl-shaped.

sulcate, grooved.

superior, of an ovary when the sepals, petals and stamens are inserted below it (hypogynous); also when the receptacle bearing the calyx, corolla and stamens is prolonged so as to be separate from the ovary, but forms a cup surrounding it (perigynous).

suture, the line of junction, or seam of union, commonly used of the line of opening of a carpel; *dorsal suture* (outer or anterior) of a carpel represents the midrib of the carpellary leaf; *ventral suture* (inner) represents the united margins on which the ovules and placentas are borne.

syncarpous, composed of two or more united carpels (see fig. 7B).

terete, cylindrical, circular in transverse section.

ternate, arranged in a whorl or cluster of three; *ternate-pinnate*, when three pinnate leaflets are borne at the summit of the main petiole; *ternately trifoliolate*, with three leaflets attached at one point.

terrestrial, on or in the ground.

testa, the outer coat of a seed.

tetradynamous, of stamens when four are longer and two shorter, as in *Cruciferae*.

thecae, anther-cells.

tomentellous, shortly tomentose.

tomentose, densely covered with short soft hairs.

torulose, cylindrical with contractions or swellings at intervals.

torus (see *receptacle*).

trifoliate, three-leaved; *trifoliolate*, having three leaflets (see fig. 6D).

trigonous, obtusely three-angled.

trimerous, in threes, e.g. of a flower with three sepals, three petals, etc.

triquetrous, with three sharp angles.

tristichous, arranged one above another in three vertical rows.

truncate, cut off more or less squarely at the end (see fig. 4D).

tuber, (1) a thickened branch of an underground stem, which produces buds; (2) a swollen root or branch of a root acting as a reserve store of nourishment.

tuberculate, covered with wart-like protuberances or knobs.

tunicated bulb, a bulb covered with complete enveloping coats, as an onion.

turbinate, top-shaped.

umbel, an inflorescence in which the divergent pedicels or rays spring from the same point; *compound umbel*, where each ray itself bears an umbel, each of the latter being called a *partial umbel*; *simple umbel*, where each ray terminates in a flower.

umbonate, bearing a small boss or elevation in the centre.
undulate, wavy on the margin (see fig. 5B).
unisexual, having stamens only or pistils only.
urceolate, urn-shaped, with a short swollen tube contracted near the top and then slightly expanded in a narrow rim.
utricle, applied (1) to the bladders of *Utricularia* ; (2) to the fruits of *Cyperaceae*, etc.
valvate, when the edges of petals or sepals meet without overlapping (see fig. 1C).
valve, (1) one of the parts produced by the splitting of a capsule when ripe ; (2) in grasses the glume next to the flower.
valvule (see *palea*).
velutinous, velvety.
venation, the arrangement of the veins of a leaf.
ventral, the inner face, or the surface towards the axis ; *ventral suture* (see *suture*).
ventricose, swollen or bulging on one side.
vernation, folding of leaves in bud.
verrucose, warty.
versatile, of an anther attached by its back to the very tip of the filament so as to swing loosely.
verticil, a whorl or arrangement of similar parts in a circle at the same level ; *verticillate*, of leaves in a whorl or several arising at the same node arranged regularly around the stem.
vexillum, the uppermost (or posterior) petal of a papilionaceous flower (see *standard*).
villous, beset with long weak hairs.
vittae, aromatic oil tubes in the fruit of some *Umbelliferae*.
viviparous, when the seeds germinate on the parent plant.
whorl (see *verticil*).
wing, (1) any flat membranous expansion ; (2) one of the two lateral petals of a papilionaceous flower.
zygomorphic (see *irregular*).

KEY TO THE PRINCIPAL GROUPS OF PLANTS AS ARRANGED IN THIS FLORA

GYMNOSPERMAE.[1]—Ovules not enclosed in an ovary; plants dioecious or monoecious; apparent flowers arranged in cones or slender spikes; no perianth; pollen-sacs ("anther-cells") ovoid, closely set on the lower face of the cone-scales or (when flowers spicate) borne on free or fused filaments (*Gnetum*); female cone-scales imbricate, stipitate and peltate, bearing a pair of sessile inverted ovules on the lower side; seeds drupe-like, with a fleshy outer coat or sometimes an aril; endosperm copious, with a slender embryo; cotyledons 2.

Shrubs or small trees with a thick, simple stem crowned with a terminal tuft of pinnate, parallel-nerved leaves which are circinate in bud; flowers in cones .. .. *Cycadaceae* (p. 45)

Slender climber, with opposite simple net-veined leaves and swollen nodes; flowers in axillary or terminal spikes .. .. *Gnetaceae* (p. 45)

ANGIOSPERMAE.—Ovules enclosed in a closed ovary; flowers not or very rarely arranged in cones; stamens usually differentiated into filament and anther; seeds with or without endosperm; cotyledons 2 or 1. Herbs, shrubs or trees, with simple or compound leaves which are not (or very rarely) circinate in bud.

DICOTYLEDONES.—Leaves usually net-veined, alternate, or opposite; floral parts mostly in fours or fives, or in multiples of these numbers, very rarely in threes or sixes (*Anonaceae* and *Menispermaceae*); cotyledons 2, rarely more. Herbs, shrubs or trees; stem in cross-section showing the vascular bundles arranged in a ring or rings. (For Key to the Families of this group, see p. 25).

Archichlamydeae (Polypetalae and Apetalae).—Petals free from each other or absent.

Metachlamydeae (Gamopetalae, Sympetalae, Choripetalae).—Petals more or less united into a tube.

MONOCOTYLEDONES.—Leaves usually parallel-veined, mostly alternate; floral parts usually in threes or sixes; cotyledon 1. Mostly herbs, rarely trees; stem in cross-section showing the vascular bundles scattered and not arranged in regular rings. (For Key to the Families of this group, see p. 40.)

[1] The description given above applies only to the two species occurring in the area dealt with in this Flora.

ARTIFICIAL KEY TO THE FAMILIES OF DICOTYLEDONES REPRESENTED IN THIS FLORA

(Extracted and adapted from Hutchinson, *The Families of Flowering Plants* I. *Dicotyledons*) [1]

KEY TO THE ARTIFICIAL GROUPS OF DICOTYLEDONES

Gynaecium composed of 2 or more separate or nearly quite separate carpels with separate styles and stigmas (rarely the free carpels immersed in the expanded torus) (*Nymphaeaceae*) .. .. "*APOCARPAE.*" [2]
Petals present, free from each other, sometimes considerably modified or scarcely distinguishable from the sepals .. .. Group 1 (p. 25)
Petals present, more or less united .. .. Group 2 (p. 26)
Petals absent .. .. Group 3 (p. 26)
Gynaecium composed of 1 carpel or 2 or more united carpels with free or united styles, or if carpels free below then the styles or stigmas united .. "*SYNCARPAE.*" [2]
Ovules attached to the wall or walls of the ovary .. .. .. "*Parietales.*" [2]
Ovary superior :
Petals present, free from each other.. .. .. Group 4 (p. 26)
Petals present, more or less united .. .. Group 5 (p. 28)
Petals absent .. .. Group 6 (p. 29)
Ovary inferior :
Petals present, free from each other .. .. Group 7 (p. 29)
Petals present, more or less united .. .. Group 8 (p. 30)
Petals absent .. .. Group 9 (p. 30)
Ovules attached to the central axis or to the base or apex of the ovary-cell "*Axiles.*" [2]
Ovary superior :
Petals present, free from each other .. .. .. Group 10 (p. 30)
Petals present, more or less united .. .. Group 11 (p. 34)
Petals absent .. .. Group 12 (p. 36)
Ovary inferior :
Petals present, free from each other .. .. .. Group 13 (p. 38)
Petals present, more or less united .. .. Group 14 (p. 39)
Petals absent .. .. Group 15 (p. 40)

GROUP 1.—*Two or more free carpels ; petals present, free from each other.*

Leaves opposite or verticillate :
Stamens numerous, 15 or more ; leaves stipulate ; fruits follicular or indehiscent, sometimes arranged on a large fleshy torus ; style often lateral or basal *Rosaceae*
Stamens up to 15 in number :
Herbs, often succulent ; leaves often connate at the base, exstipulate ; flowers mostly cymose ; carpels the same number as the petals ; seeds often minute, with fleshy endosperm .. .. *Crassulaceae*
Trees, shrubs or woody climbers ; carpels 1–3 ; petals often clawed, thin ; stipules mostly intrapetiolar, often connate at the base ; sepals often with 2 glands at the base ; hairs on the leaves usually medifixed .. .. .. *Malpighiaceae*
Leaves alternate or all radical :
Leaves stipulate (to p. 26) :
Stamens free from one another, or nearly so ; fruits follicular or indehiscent, often arranged on a large fleshy torus ; sepals imbricate ; seeds without endosperm *Rosaceae*
Stamens free from one another or nearly so ; fruits not on an enlarged torus ; trees with large leaves and stellate hairs ; sepals valvate ; seeds with copious endosperm *Tiliaceae*

[1] Macmillan & Co., Ltd., St. Martin's Street, London, 1926, price 20*s*.

[2] The names used for these groups are applied here for the convenience of the student. The " Parietales " in this sense are not the *Parietales* of either Bentham and Hooker or of Engler.

Stamens more or less united into a column ; calyx valvate ; mostly trees or shrubs indumentum often stellate or lepidote .. .. *Sterculiaceae*

Leaves without stipules :

Carpels completely sunk in the tissue of the large broad torus ; aquatic plants with floating leaves and bright showy flowers .. .. *Nymphaeaceae*

Carpels not sunk in the tissue of the torus ; not aquatic :

Stamens the same number and opposite to the petals ; carpels usually 3 ; leaves simple ; fruit drupaceous ; endosperm sometimes ruminate .. *Menispermaceae*

Stamens alternate with the petals or monadelphous or more numerous than the petals :

Stamens numerous (more than 12) :

Flowers usually hermaphrodite, mostly fairly large and solitary ; anthers usually with a broad truncate connective ; seeds with abundant ruminate endosperm. *Anonaceae*

Flowers dioecious, small ; anthers with a narrow connective ; lateral nerves of the leaves not markedly prominent .. .. *Menispermaceae*

Flowers hermaphrodite, paniculate, small to medium-sized ; anthers small with a narrow connective ; lateral nerves of the leaves prominent and parallel ; seeds arillate ; sepals persistent and often accrescent .. *Dilleniaceae*

Stamens few (12 or fewer) :

Leaves compound or very much divided :

Herbs ; fruit an achene ; seed with copious endosperm and small embryo ; flowers mostly yellow .. .. *Ranunculaceae*

Trees or shrubs ; fruit a follicle ; seeds without endosperm ; leaves pinnate *Connaraceae*

Leaves simple :

Flowers hermaphrodite ; shrubs or trees ; seeds arillate, aril entire, more or less cupular ; petals 5 .. .. *Connaraceae*

Flowers unisexual ; petals and stamens in threes or multiples of three *Menispermaceae*

GROUP 2.—Two or more free carpels ; petals present, more or less united.

Herbs with fleshy leaves ; flowers racemose, cymose or paniculate ; corolla more or less tubular ; calyx sometimes inflated and membranous *Crassulaceae*

Trees, shrubs or climbers with usually pinnate or unifoliolate leaves ; petals very shortly connate at the base ; seeds often arillate ; calyx never inflated .. *Connaraceae*

GROUP 3.—Two or more free carpels ; petals absent.

Trees, shrubs or hard-wooded climbers ; leaves simple or rarely compound :

Leaves stipulate ; stamens free or slightly connate at the base ; anthers opening by slits ; fruits drupaceous, included by the tubular calyx .. .. .. *Rosaceae*

Leaves stipulate ; stamens united into a column ; anthers in a ring around the top of the column or unequally arranged, opening by slits ; hairs often stellate *Sterculiaceae*

Leaves exstipulate ; stamens free on the inside of the hollow calyx or receptacle ; anthers often opening by valves .. .. *Monimiaceae*

Herbs with radical or alternate, never digitate leaves, or very soft-wooded climbers or herbs with often opposite toothed or divided leaves and rather broad medullary rays in the wood :

Carpels usually numerous, rarely reduced to 1 and then stipitate, often with long hairy tails ; sepals induplicate-valvate or rarely imbricate, often petaloid ; stamens free ; leaves sometimes opposite and much divided .. .. *Ranunculaceae*

Carpels definite in number, often 3 or 6 ; flowers unisexual ; stamens free or variously connate ; climbers with simple leaves .. .. *Menispermaceae*

Herbs with opposite or subopposite entire leaves ; carpels usually 5 ; flowers small in fascicles .. .. *Molluginaceae*

Herbs with digitately lobed leaves ; carpels 5, not all fertile, stipitate ; stamens 4 *Rosaceae*

GROUP 4.—One carpel or more than one united carpels ; ovules on the walls of the ovary ; ovary superior ; petals present, free from each other.

Leaves opposite (to p. 27) :

Stamens more or less united into 3 or more separate bundles ; leaves often gland-dotted or with lines of resin :

Mostly herbaceous ; leaves often with pellucid dots ; styles free to the base or very nearly so .. .. *Hypericaceae*

Trees or shrubs ; leaves often with lines of resin and very numerous lateral nerves ; stigma sessile or subsessile .. .. *Guttiferae* (Allanblackia)

Stamens free or more or less united into not more than 2 separate bundles (diadelphous), sometimes adnate to a gynophore ; leaves not or very rarely glandular :

Connective of the anthers produced above the cells ; flowers often somewhat zygomorphic (irregular), the lower petal often gibbous or saccate at the base *Violaceae*
Connective of the anthers not produced beyond the cells ; flowers usually actinomorphic (regular) or papilionaceous :
Flowers actinomorphic, sessile ; leaves small and ericoid, more or less connate at the base ; stamens free .. .. *Frankeniaceae*
Flowers zygomorphic ; stamens diadelphous ; fruit a legume .. *Papilionaceae*

Leaves alternate or all radical :
Stamens numerous (more than 12) :
Filaments more or less connate into a tube or into separate bundles :
Filaments connate in 1 or 2 unequal bundles ; leaves compound ; flowers mostly arranged in dense spikes or heads .. .. *Mimosaceae*
Filaments connate into more than 2 separate bundles opposite the sepals ; calyx valvate ; fruits prickly .. .. *Tiliaceae*
Filaments connate in bundles opposite the petals ; calyx imbricate ; flowers in slender spikes or panicles .. .. *Samydaceae*
Filaments free or at most partially adnate to a gynophore :
Ovary supported on a gynophore ; petals often clawed ; seeds without endosperm :
Leaves simple or digitate .. .. *Capparidaceae*
Leaves pinnate .. .. *Papilionaceae*
Ovary sessile or very nearly so :
Anthers horse-shoe-shaped ; ovary-placentas 2 ; ovules numerous ; stipules caducous, leaving a wide scar ; leaves large, digitately nerved at the base ; pedicels often with 5 large glands below the sepals .. .. *Bixaceae*
Anthers straight or nearly so, opening by apical pores or short pore-like slits :
Seeds hairy ; ovary entire ; leaves digitately nerved or lobed ; stems annual from a woody rhizome with yellow interior .. .. .. *Cochlospermaceae*
Seeds not hairy ; ovary often deeply lobed, in fruit the carpels becoming nearly free on the enlarged torus ; leaves pinnately nerved ; stems not or rarely annual *Ochnaceae*
Anthers straight or nearly so, opening by longitudinal slits :
Flowers actinomorphic (regular) :
Leaves stipulate, the stipules sometimes falling off early but leaving a scar :
Corona present in the flowers .. .. *Passifloraceae*
Corona absent :
Stamens and petals hypogynous :
Leaves usually pinnate ; wood often with resinous juice *Anacardiaceae*
Leaves simple ; wood without resinous juice .. .. *Flacourtiaceae*
Stamens and petals perigynous .. .. *Rosaceae*
Leaves without stipules :
Trees or shrubs ; leaves never lobed .. .. *Flacourtiaceae*
Herbs with milky juice ; stems glaucous ; leaves amplexicaul, pinnately lobed or sinuate .. .. *Papaveraceae*
Flowers zygomorphic (irregular) :
Ovary of 1 carpel ; trees or shrubs :
Odd petal abaxial ; corolla not as below .. .. .. *Caesalpiniaceae*
Odd petal adaxial ; corolla composed of standard, wings and keel *Papilionaceae*
Ovary of more than 1 carpel ; herbs ; petals often divided .. *Resedaceae*
Stamens 12 or fewer :
Stamens 6, four long and two short (tetradynamous) ; petals 4, clawed *Cruciferae*
Stamens not as above, very rarely 6 and then of equal length ; petals rarely 4 :
Flowers markedly zygomorphic (irregular) :
Fertile stamens sometimes only 2 ; ovary often on a short or long gynophore :
Ovary of more than 1 carpel (i.e. with more than 1 placenta) .. *Capparidaceae*
Ovary of 1 carpel (i.e. with only 1 placenta) ; leaves usually pinnate *Caesalpiniaceae*
Fertile stamens usually 10 or 8, more than 2 :
Anthers often with a produced connective ; herbs .. .. .. *Violaceae*
Anthers without a produced connective, sometimes with a gland at the apex ; habit various, but mostly trees, shrubs or climbers :
Ovary with 3 placentas ; anthers 1-celled ; petals imbricate ; stamens 5 fertile and 5 barren .. .. *Moringaceae*
Ovary with 1 placenta ; anthers 2-celled :
Corolla papilionaceous, i.e. upper (adaxial) petal outside the others *Papilionaceae*
Corolla not papilionaceous, i.e. upper (adaxial) petal inside the others *Caesalpiniaceae*
Flowers actinomorphic (regular) :
Flowers with a distinct corona, sometimes this membranous or represented by a definite ring of hairs towards the base of the calyx-tube .. *Passifloraceae*

Flowers without a corona :
Stamens united, with the anthers in a ring around the apex of the column ; endosperm of the seeds often ruminate ; mostly weak climbers *Menispermaceae*
Stamens free or united only at the base or rarely only the anthers connivent :
Leaves stipulate ; anthers with the connective produced above the cells, often connivent around the style .. .. *Violaceae*
Leaves stipulate ; anther-connective not produced :
Staminodes present, sometimes petaloid ; stipules often pectinate *Ochnaceae*
Staminodes absent :
Leaves with numerous very sticky glandular hairs, mostly circinately coiled in bud ; seeds not carunculate .. .. *Droseraceae*
Leaves without sticky hairs, not circinate in bud ; seeds often carunculate or arillate :
Styles free to the base .. .. *Turneraceae*
Style simple or shortly divided .. .. *Passifloraceae*
Leaves exstipulate :
Herbs ; leaves entire or lobed ; flowers yellow or orange ; seeds pitted, arillate *Turneraceae*

Trees, shrubs or climbers :
Leaves simple, but sometimes deeply divided :
Leaves biglandular at the base .. .. *Passifloraceae*
Leaves not glandular at the base :
Leaves digitately lobed .. .. *Caricaceae*
Leaves not digitately lobed ; calyx-tube short ; stamens hypogynous *Pittosporaceae*
Leaves not digitately lobed ; calyx-tube rather long ; stamens perigynous *Turneraceae*
Leaves very small and more or less ericoid ; flowers in slender spikes or racemes .. .. *Tamaricaceae*
Leaves compound :
Flowers in heads or dense spikes ; petals valvate ; ovary of 1 carpel ; ovules more than 1 .. .. *Mimosaceae*
Flowers not in heads or dense spikes ; ovary usually of more than 1 carpel ; ovule solitary .. .. *Anacardiaceae*
Flowers racemose ; ovary of 5 carpels with numerous ovules *Caricaceae*

GROUP 5.—*One carpel or more than one united carpels ; ovules on the walls of the ovary ; ovary superior ; petals present, more or less united.*

Stamens free from the corolla-tube (to p. 29) :
Ovary composed of more than one carpel :
Stamens numerous, more than twice the number of the corolla-lobes ; anthers opening by longitudinal slits with broadened truncate connective ; seeds with copious ruminate endosperm ; shrubs, trees or climbers with exstipulate simple leaves *Anonaceae*
Stamens 5–12 ; anthers not appendaged at the apex, usually opening by longitudinal slits, rarely by pores ; leaves alternate, exstipulate ; erect trees or shrubs :
Leaves fairly large ; flowers more or less corymbose :
Branches without hooks ; calyx not becoming wing-like in fruit ; stamens 5 *Pittosporaceae*
Branches with hooks ; calyx enlarging and becoming wing-like in fruit ; stamens 9–10 .. .. *Ancistrocladaceae*
Leaves very small and scale-like ; flowers in slender spikes or racemes ; stamens 5–10 .. .. *Tamaricaceae*
Ovary composed of a single carpel (fruit usually a legume) ; stamens free or more usually diadelphous or monadelphous, often 10, rarely numerous :
Stamens connate into a sheath or free ; flowers usually hermaphrodite :
Flowers actinomorphic (regular) ; petals valvate ; calyx gamosepalous or valvate ; leaves usually bipinnate, rarely simply pinnate ; flowers often collected into heads .. .. *Mimosaceae*
Flowers zygomorphic (irregular) or rarely actinomorphic ; sepals imbricate or rarely valvate ; petals imbricate, the upper (adaxial) one inside the others ; leaves often pinnate or bipinnate .. .. *Caesalpiniaceae*
Flowers zygomorphic ; petals imbricate, the upper (adaxial) one (the standard) outside the others, the lateral two (the wings) outside the abaxial pair (the keel), which are more or less united along their lower edges ; leaves simple, digitate or simply pinnate .. .. *Papilionaceae*
Stamens connate into a column with the anthers in a ring at the top ; flowers dioecious ; fruit a drupe ; slender climbers .. .. .. *Menispermaceae*

Stamens inserted on the corolla-tube, sometimes near its base :
Stamens double the number of the corolla-lobes, usually monadelphous ; corolla sometimes zygomorphic :
Flowers zygomorphic (irregular), often somewhat papilionaceous, hermaphrodite ; seeds often hairy ; leaves small to medium-sized .. .. .. *Polygalaceae*
Flowers actinomorphic (regular), unisexual or polygamous ; seeds with a succulent coat ; leaves large, palmately lobed .. .. *Caricaceae*
Stamens the same number as the corolla-lobes ; corolla actinomorphic or nearly so :
Leaves opposite :
Carpels 2, more or less free ; pollen granular ; no corona in the corolla ; mostly shrubs, trees or climbers .. .. *Apocynaceae*
Carpels 2, free ; styles separate up to the common thickened apex ; pollen agglutinated into masses ; corolla with a corona ; mostly herbs or twiners *Asclepiadaceae*
Carpels 2, connate into a 1- or 2-celled ovary ; pollen not agglutinated ; one common style present :
Stamens 5 ; ovules numerous ; herbs ; corolla actinomorphic *Gentianaceae*
Stamens 4 ; ovules 1–2 in each cell ; habit various ; corolla usually zygomorphic *Verbenaceae*
Leaves alternate or radical ; marsh or aquatic herbs :
Corolla-lobes imbricate or contorted ; styles 2, free or partly united *Hydrophyllaceae*
Corolla-lobes induplicate-valvate ; style 1, with 1–2 stigmas *Gentianaceae*
Stamens fewer than the corolla-lobes, 4 or 2 ; corolla zygomorphic or rarely subactinomorphic :
Leafless parasitic (on roots) never green herbs ; seeds minute, very numerous, with endosperm .. .. *Orobanchaceae*
Leafy and not parasitic :
Ovules numerous on each placenta :
Mostly trees ; seeds transverse in the fruit, winged .. .. *Bignoniaceae*
Mostly herbaceous ; seeds minute, not winged .. .. .. *Gesneriaceae*
Ovules 1–2 on each placenta ; stem and branches often 4-sided *Verbenaceae*

GROUP 6.—*One carpel or more than one united carpels ; ovules on the walls of the ovary ; ovary superior ; petals absent.*

Flowers arranged in a dense head surrounded by numerous imbricate bracts ; stamens 4, opposite the calyx- (or perianth-) lobes, the latter valvate, one splitting away from the other three ; leaves alternate, without stipules .. .. *Proteaceae*
Flowers variously arranged, but not in heads with an involucre of bracts ; remainder of above characters not associated :
Ovary composed of 1 carpel (i.e. with 1 placenta) :
Stamens numerous, free or very slightly connate at the base ; pod stipitate *Papilionaceae* (Cordyla)
Stamens 10 or fewer :
Flowers hermaphrodite, not very small ; leaves usually compound *Caesalpiniaceae*
Flowers unisexual or polygamous, usually very small ; leaves usually simple :
Ovule pendulous ; anthers erect in bud ; flowers solitary or cymose or fasciculate *Ulmaceae*
Ovule pendulous or erect ; anthers erect or inflexed in bud ; flowers often on or within an enlarged and often fleshy receptacle or in catkins or heads *Moraceae*
Ovary composed of more than 1 carpel (at least with 2 or more placentas) :
Ovary and fruit stipitate ; seeds usually without endosperm and often with a curved embryo ; sepals usually valvate .. .. *Capparidaceae*
Ovary sessile :
Inflorescence a catkin ; flowers dioecious ; seeds pilose with a basal tuft of hairs, without endosperm .. .. *Salicaceae*
Inflorescence not a catkin but sometimes a slender pendulous spike or raceme ; flowers usually hermaphrodite ; seeds with endosperm :
Flowers hypogynous ; no staminodes between the stamens ; filaments free *Flacourtiaceae*
Flowers perigynous ; staminodes often present and alternating with the fertile stamens ; filaments free or connate .. .. *Samydaceae*

GROUP 7.—*One carpel or more than one united carpels ; ovules on the walls of the ovary ; ovary inferior ; petals present, free from each other.*

Flowers hermaphrodite ; anthers straight or nearly so (to p. 30) :
Anthers opening by pores ; leaves mostly opposite with parallel main nerves ; stamens definite, often double the number of the petals .. .. *Melastomataceae*

Anthers not opening by pores :
Fleshy herbs or shrubs with reduced leaves and often epiphytic ; stamens numerous ; seeds without endosperm .. .. *Cactaceae*
Tree or shrubs with well-developed green leaves ; seeds with endosperm ; stamens sometimes opposite the petals .. .. *Samydaceae*
Flowers unisexual ; stamens few, with twisted or conduplicate anthers ; usually slender twiners with tendrils ; leaves often scabrid .. .. *Cucurbitaceae*

GROUP 8.—*One carpel or more than one united carpels ; ovules on the walls of the ovary ; ovary inferior ; petals present more or less united.*

Flowers unisexual ; leaves alternate without longitudinally parallel nerves ; tendrils often present ; stamens mostly 3 ; anthers often twisted or conduplicate *Cucurbitaceae*
Flowers hermaphrodite ; leaves opposite or verticillate, often with longitudinally parallel nerves, without stipules ; anthers mostly opening by terminal pores *Melastomataceae*
Flowers hermaphrodite, very rarely unisexual ; leaves opposite or alternate, often stipulate ; anthers not opening by pores, sometimes connivent at the apex :
Ovules numerous ; petals united into a long tube ; stipules persistent, inter- or intra-petiolar .. .. *Rubiaceae* (Gardenia)
Ovules solitary ; hooks present on branches ; petals united only at the base ; stipules small and deciduous .. .. *Ancistrocladaceae*

GROUP 9.—*One carpel or more than one united carpels ; ovules on the walls of the ovary ; ovary inferior ; petals absent ; leaves exstipulate ; calyx unilateral or 3-lobed and often coloured* .. .. *Aristolochiaceae*

GROUP 10.—*One carpel or more than one united carpels ; ovules attached to the central axis or to the base or apex of the ovary cell ; ovary superior ; petals present, free from each other.*

Perfect stamens the same number as the petals and opposite to them ; leaves alternate or rarely opposite or all radical :
Leaves not gland-dotted ; petals and stamens more or less hypogynous or subperigynous ; disk usually conspicuous :
Calyx-lobes or sepals imbricate, usually 2 ; stipules often scarious or setose ; ovary 1-celled, with basal placenta .. .. *Portulacaceae*
Calyx-lobes valvate or open in bud :
Disk absent from the flowers :
Trees or shrubs ; ovules usually 2 or more, inserted on the inner angle of the cells ; hairs on the leaves often stellate .. .. .. *Sterculiaceae*
Herbs mostly with rosettes of leaves ; flowers in corymbs ; calyx-tube scarious, ribbed ; ovule 1, pendulous on a basal funicle .. .. *Plumbaginaceae*
Disk present, perigynous ; leaves mostly stipulate ; ovary 2–4-celled ; ovules erect ; seeds mostly with copious endosperm and large straight embryo *Rhamnaceae*
Disk present ; leaves exstipulate :
Ovules erect ; ovary 1–3-celled ; calyx conspicuous .. .. .. *Olacaceae*
Ovules pendulous ; ovary 1-celled ; calyx minute .. .. .. *Opiliaceae*
Leaves gland-dotted :
Leaves simple, without stipules ; ovules numerous on a free-central placenta ; no tendrils .. .. *Myrsinaceae*
Leaves mostly compound, usually stipulate ; inflorescence leaf-opposed ; ovules 1–2 in each cell, inserted on the inner angle ; tendrils often present *Ampelidaceae*
Perfect stamens the same number as the petals and alternate with them or more numerous, very rarely fewer :
Style basal ; stipules mostly persistent ; leaves simple ; stamens numerous ; stomata of the leaves usually with special subsidiary cells .. .. *Rosaceae*
Style or styles terminal or subterminal, sometimes gynobasic :
Flowers markedly zygomorphic (irregular) (to p. 31) :
Lower sepal neither spurred nor saccate ; mostly herbs with simple leaves ; anthers opening by apical pores .. .. *Polygalaceae*
Lower sepal subsaccate ; trees or shrubs with pinnate stipulate leaves ; anthers free, opening lengthwise .. .. *Melianthaceae*
Lower sepal more or less elongated into a spur ; sepals usually 3 ; anthers connivent around the ovary, opening lengthwise ; seeds without endosperm *Balsaminaceae*

Flowers actinomorphic or very slightly zygomorphic :
Stamens united into more than one separate bundle (phalanges) often opposite the petals ; leaves usually opposite, often gland-dotted or with resinous lines :
Leaves opposite, exstipulate ; calyx imbricate :
Herbs or shrubs ; styles free from the base or nearly so ; flowers hermaphrodite *Hypericaceae*
Trees or shrubs ; styles mostly more or less united or stigma one and sessile or subsessile ; flowers mostly unisexual .. .. *Guttiferae*
Leaves alternate, stipulate ; trees, shrubs or herbs ; calyx valvate ; hairs usually stellate :
Stamens with some of the filaments sterile ; fruits not hooked *Sterculiaceae*
Stamens all fertile ; fruits covered with hooks .. .. .. *Tiliaceae*
Stamens free (at least not united into several bundles) or sometimes more or less united at the base or into one bundle (monadelphous) :
Leaves opposite or verticillate or rarely fasciculate, never all radical (to p. 32) :
Leaves compound, rarely unifoliolate and then with a distinctly tumid petiole, sometimes sessile :
Leaves gland-dotted ; disk usually present between the stamens and ovary ; ovary often deeply lobed ; ovules pendulous, 2 in each cell ; stipules rarely present .. .. *Rutaceae*
Leaves not gland-dotted, sometimes fleshy ; ovules pendulous from the central axis, 2 or more in each cell ; disk often fleshy, rarely absent ; stipules persistent and often paired ; shrubs or herbs ; leaves mostly 2-foliolate or pinnate ; filaments often with a scale or gland attached to the base *Zygophyllaceae*
Leaves simple but sometimes deeply and variously divided :
Stamens more than twice as many as the petals ; calyx valvate :
Flowers hermaphrodite ; anthers not inflexed in bud :
Petals and stamens hypogynous ; hairs often stellate ; stipules in pairs *Tiliaceae*
Petals and stamens perigynous ; hairs not stellate ; stipules interpetiolar *Rhizophoraceae*
Flowers hermaphrodite ; anthers inflexed in bud ; petals and stamens perigynous .. .. *Lythraceae*
Flowers unisexual ; anthers inflexed in bud ; hairs stellate or lepidote *Euphorbiaceae*
Stamens not more than twice as many as the petals :
Trees, shrubs or woody climbers (to p. 32) :
Leaves stipulate, sometimes stipules rudimentary or of hairs :
Stipules intrapetiolar, often connivent into one or adnate to the petiole ; sepals usually glandular outside or accrescent in fruit ; hairs medifixed ; leaves often biglandular at the base .. .. .. *Malpighiaceae*
Stipules not intrapetiolar, sometimes rudimentary :
Disk absent or inconspicuous or of separate glands ; calyx often glandular :
Calyx mostly with a pair of glands outside ; trees, shrubs or climbers ; stamens mostly 10 .. .. *Malpighiaceae*
Calyx not glandular ; anther-cells back to back ; trees or shrubs ; petals 4 ; stamens 4 .. .. *Salvadoraceae*
Disk present, conspicuous ; calyx not glandular :
Flowers hermaphrodite :
Stamens inserted on or below the margin of the disk ; filaments subulate :
Stamens 3–5 ; sepals imbricate .. .. .. *Celastraceae*
Stamens 8–10 ; sepals valvate .. .. *Rhizophoraceae*
Stamens usually 3, inserted on the disk ; filaments flattened or connivent, often adnate to the ovary ; sepals imbricate .. *Hippocrateaceae*
Flowers unisexual ; ovules pendulous from the apex of the cell ; seeds often caruncolate.. .. .. *Euphorbiaceae*
Leaves exstipulate or stipules gland-like :
Anthers opening at the apex by a pore, often appendaged at the base ; stamens as many or twice as many as the petals ; leaves often with 3–9 longitudinally parallel nerves .. .. *Melastomataceae*
Anthers opening by slits lengthwise ; leaves usually with pinnate nerves :
Ovules numerous in each cell ; anthers inflexed in bud ; calyx more or less tubular, with valvate lobes, often with accessory lobes *Lythraceae*
Ovules few in each cell :
Sepals 2-glandular outside ; hairs on the leaves (when present) medifixed ; shrubs or climbers ; fruits usually winged .. .. *Malpighiaceae*

Sepals not glandular ; hairs not medifixed :
Ovules pendulous from the apex of the cells :
Calyx fairly long and tubular, more or less petaloid ; petals usually very small .. .. *Thymelaeaceae*
Calyx rather short ; petals fairly large, sometimes bearded *Icacinaceae*
Ovules erect or ascending from the base of the cells ; calyx imbricate :
Filaments subulate or filiform ; stamens usually 5 .. *Celastraceae*
Filaments flattened ; stamens usually 3 .. .. *Hippocrateaceae*
Herbs, sometimes slightly woody at the base :
Ovary incompletely septate, with free-central placentation ; leaves mostly stipulate .. .. *Caryophyllaceae*
Ovary completely septate :
Leaves stipulate ; stipules paired ; styles free to the base ; ovules numerous, axile .. .. *Elatinaceae*
Leaves exstipulate :
Leaves with 3 or more longitudinally parallel nerves ; anthers usually appendaged and opening by a terminal pore .. .. *Melastomataceae*
Leaves not as above ; anthers opening by longitudinal slits :
Stamens perigynous ; anthers inflexed in bud ; petals imbricate *Lythraceae*
Stamens hypogynous ; anthers not inflexed in bud ; minute herb ; petals contorted .. .. *Linaceae*
Leaves alternate or all radical :
Stamens more than twice the number of the sepals or petals (to p. 33) :
Sepals valvate or open in bud :
Anthers 2-celled ; calyx without an epicalyx :
Stamens free or slightly united only at the base :
Calyx closed in bud :
Flowers hermaphrodite ; leaves simple ; wood not resinous *Tiliaceae*
Flowers unisexual ; leaves entire or 3-lobed ; petiole with 2 glands at the top .. .. *Euphorbiaceae*
Flowers usually polygamous ; leaves mostly compound ; petiole not glandular at the top ; wood resinous .. .. .. *Anacardiaceae*
Calyx open in bud ; leaves simple :
Stamens numerous in several series united at the base ; ovules about 6 in each cell .. .. *Scytopetalaceae*
Stamens up to 20, free or nearly so .. .. *Olacaceae*
Stamens more or less united into a tube or into bundles, hypogynous ; indumentum usually stellate .. .. *Sterculiaceae*
Anthers 1-celled ; stamens more or less monadelphous ; calyx with or without an epicalyx :
Trees or rarely shrubs ; leaves digitately compound ; carpels not or very rarely splitting away from the central axis in fruit .. *Bombacaceae*
Mostly herbs ; leaves simple ; carpels often splitting away from the central axis or becoming free in fruit .. .. *Malvaceae*
Sepals imbricate or rarely completely connate or calyptrate :
Petals and stamens perigynous ; leaves stipulate :
Seeds with endosperm and a curved embryo ; mostly herbs ; sepals 2 *Portulacaceae*
Seeds without endosperm ; sepals more than 2 .. .. .. *Rosaceae*
Petals and stamens more or less hypogynous or flowers unisexual ; disk often present :
Trees, shrubs or woody climbers (to p. 33) :
Leaves compound, pinnate or rarely unifoliolate and then with a tumid petiole :
Ovule ascending :
Leaves gland-dotted ; style or styles central .. .. .. *Rutaceae*
Leaves rarely gland-dotted ; styles or stigmas often separated :
Wood with resin ducts ; leaves scented ; style or stigma often excentric *Anacardiaceae*
Wood not resinous ; leaves not or rarely scented ; style or stigma central *Sapindaceae*
Ovule or ovules pendulous ; wood without resin ducts ; bark bitter ; leaves usually not gland-dotted .. .. *Simarubaceae*
Leaves simple :
Flowers unisexual ; disk present .. .. *Euphorbiaceae*
Flowers hermaphrodite :
Torus enlarged after flowering ; ovary mostly deeply lobed, the carpels becoming separated in fruit ; anthers often opening by pores *Ochnaceae*

Torus not enlarged ; calyx enlarged and wing-like in fruit :
Flowers mostly rather small and not showy ; petals much contorted ; ovary 2- or more-celled ; leaves with comparatively few lateral nerves *Dipterocarpaceae*
Flowers showy ; ovary 1-celled with a basal placenta ; leaves long, with very numerous parallel lateral nerves .. .. .. *Ochnaceae*
Herbs ; sepals 2 ; leaves fleshy, exstipulate ; ovary 1-celled with numerous ovules ; seeds strophiolate .. .. *Portulacaceae*
Stamens definite in number in relation to the sepals or petals, often the same number or twice as many or fewer :
Leaves compound, rarely unifoliolate and then with a distinctly tumid petiole :
Stamens united into a tube ; leaves pinnate or rarely unifoliolate :
Leaves exstipulate ; flowers actinomorphic ; seeds often winged *Meliaceae*
Leaves with intrapetiolar stipules ; flowers slightly zygomorphic ; seeds not winged .. .. *Melianthaceae*
Stamens free or united only at the base :
Leaves stipulate :
Herbaceous or slightly woody ; leaves digitately or pinnately compound *Oxalidaceae*
Trees, shrubs or often climbers :
Stipules lateral ; leaves more than 1-foliolate ; seeds without endosperm *Sapindaceae*
Stipules lateral ; leaves 1-foliolate or simple .. .. .. *Linaceae*
Stipules intrapetiolar ; leaves pinnate ; seeds with endosperm *Melianthaceae*
Leaves exstipulate :
Leaves gland-dotted .. .. *Rutaceae*
Leaves not gland-dotted :
Ovules pendulous :
Leaflets 2 ; shrubs or trees with axillary or supra-axillary spines *Simarubaceae*
Leaflets more than 2 :
Ovary of more than 1 carpel, 2- or more-celled .. *Burseraceae*
Ovary usually of 1 carpel .. .. *Anacardiaceae*
Ovules ascending or horizontal :
Ovules 2 in each cell, collateral ; style simple ; ovary of 1 carpel *Connaraceae*
Ovules 1 or more in each cell, erect or ascending ; style simple or divided ; ovary of more than 1 carpel .. .. *Sapindaceae*
Leaves simple :
Anthers opening by apical pores ; ovary deeply lobed, torus enlarging in fruit and the carpels often becoming separate ; ovules 1–2 in each cell *Ochnaceae*
Anthers opening by slits lengthwise :
Shrubs or trees (to p. 34) :
Leaves stipulate :
Flowers unisexual :
Disk absent ; calyx cupular ; male petals valvate ; ovary 3–4-celled ; fruits drupaceous, beaked .. .. *Pandaceae*
Disk present :
Petals entire :
Stipules conspicuous, persistent .. .. .. *Euphorbiaceae*
Stipules very inconspicuous, caducous .. .. .. *Celastraceae*
Petals bilobed ; stamens 5 ; disk composed of hypogynous glands opposite the petals .. .. *Chailletiaceae*
Flowers hermaphrodite :
Stipules axillary :
Stipules convolute in bud, often very large ; ovary entire, 2-celled ; petals entire ; ovule inserted in the middle of the placenta *Simarubaceae* (Irvingia)
Stipules small ; ovary 3–5-celled :
Stipules persistent ; fruit a drupe .. .. .. *Erythroxylaceae*
Stipules caducous ; fruit a capsule .. .. *Linaceae*
Stipules not axillary :
Petals entire or emarginate ; ovules erect ; disk entire or lobed *Celastraceae*
Petals often deeply lobed ; ovules pendulous ; disk of separate glands opposite the petals .. .. *Chailletiaceae*
Leaves exstipulate :
Stamens united into a tube ; sepals not glandular ; ovary 2- or more-celled .. .. *Meliaceae*

Stamens free or connate only at the base :
Stamens hypogynous or very slightly perigynous :
Stamens double the number of the petals or fewer only by the abortion of some anthers :
Sepals usually with two large glands outside ; hairs of leaves medifixed ; ovary 3-celled, with 1 ovule in each cell ; seeds without endosperm ; fruit often winged .. .. *Malpighiaceae*
Sepals not glandular ; hairs rarely medifixed :
Ovary 1-celled :
Leaves fairly large ; flowers in panicles ; fruit supported on the enlarged torus .. .. *Anacardiaceae*
Leaves very small and crowded ; flowers in slender spikes or racemes *Tamaricaceae*
Ovary 2- or more-celled :
Petal-base not scale-like or hairy :
Disk present ; petals mostly valvate ; ovary 3–5-celled *Olacaceae*
Disk intrastaminal, closely surrounding the ovary ; petals imbricate or contorted ; ovary 5–7-celled .. .. *Humiriaceae*
Disk absent ; flowers unisexual ; ovary 3–4-celled ; male petals valvate ; racemes more or less fasciculate from the older wood *Pandaceae*
Petal-base scale-like and hairy within ; flowers unisexual or polygamous ; ovary 5-celled, ovules 2–3-seriate *Pentadiplandraceae*
Stamens the same number as the petals or fewer ; petals valvate ; disk rarely present .. .. *Icacinaceae*
Stamens distinctly perigynous ; calyx tubular and often petaloid ; petals mostly very small and scale-like .. .. .. *Thymelaeaceae*
Herbs :
Flowers hermaphrodite ; disk absent :
Sepals valvate ; bark fibrous ; leaves often with thread-like tails at the base *Tiliaceae*
Sepals imbricate ; leaves not tailed at the base ; ovary long-beaked *Geraniaceae*
Sepals imbricate ; ovary not beaked .. .. .. *Molluginaceae*
Flowers unisexual ; disk present or obscure .. .. *Euphorbiaceae*

GROUP 11.—*One carpel or more than one united carpels ; ovules attached to the central axis or to the base or apex of the ovary cell ; ovary superior ; petals present, more or less united.*

Stamens the same number as and opposite the corolla-lobes :
Ovules solitary in the whole ovary or in each cell of the ovary ; style often lobed :
Trees or shrubs, often with hard wood :
Petals imbricate ; hairs often stellate or medifixed ; staminodes often present, sometimes petaloid .. .. *Sapotaceae*
Petals valvate ; hairs usually simple ; usually no staminodes :
Inflorescence not leaf-opposed ; leaves simple, without tendrils *Olacaceae*
Inflorescence leaf-opposed ; leaves often compound ; mostly climbers with tendrils *Ampelidaceae*
Herbs or climbers :
Corolla lobes valvate ; tendrils often present ; inflorescence usually cymose-paniculate, leaf-opposed ; leaves usually with the stipules adnate to the petiole ; petals united at the base only .. .. *Ampelidaceae*
Corolla lobes imbricate ; no tendrils ; inflorescence more or less corymbose ; petals united high up .. .. *Plumbaginaceae*
Ovules 2 or more in each cell ; style undivided ; placentas basal :
Trees or shrubs with often gland-dotted simple leaves ; leaves exstipulate *Myrsinaceae*
Herbs or climbers with usually compound stipulate leaves and leaf-opposed inflorescence .. .. *Ampelidaceae*
Herbs with opposite simple leaves and solitary or axillary scarlet, blue or rose flowers ; leaves not gland-dotted, exstipulate .. .. *Primulaceae*
Stamens the same number as the corolla-lobes and alternate with them, or more numerous or fewer :
Stamens more than twice as many as the corolla-lobes (to p. 35) :
Flowers unisexual ; corolla-lobes about 5 ; leaves stipulate .. *Euphorbiaceae*
Flowers hermaphrodite, large, solitary ; leaves exstipulate .. *Lecythidaceae*
Flowers hermaphrodite, small, racemose ; leaves exstipulate .. *Scytopetalaceae*

Stamens as many as or up to twice as many as the corolla-lobes or fewer :
Stamens as many as or more than the corolla-lobes (to p. 36) :
Flowers zygomorphic (irregular) :
Petals united only at the base ; seeds often pilose ; ovules pendulous *Polygalaceae*
Petals united high up into a tube :
Ovules numerous in each cell ; herbs ; corolla-lobes 5 .. .. *Solanaceae*
Ovules solitary in each complete or incomplete cell ; habit various ; corolla-lobes 4 .. .. *Verbenaceae*
Flowers actinomorphic (regular) :
Leaves opposite or verticillate, mostly exstipulate :
Anthers opening by apical pores or pore-like slits :
Leaves in whorls ; woody shrubs or under-shrubs with usually very small leaves ; stamens hypogynous .. .. *Ericaceae*
Leaves paired ; herbs ; stamens epipetalous .. .. .. *Gentianaceae*
Anthers opening by longitudinal slits :
Styles single, with often a large more or less capitate stigma :
Corona present in the flowers ; mostly herbs or weak twiners, often with milky juice .. .. *Asclepiadaceae*
Corona absent :
Leaves exstipulate :
Trees, shrubs or climbers often with milky juice ; corolla-lobes contorted or rarely valvate .. .. *Apocynaceae*
Herbs ; corolla-lobes imbricate ; disk present .. .. *Scrophulariaceae*
Herbs with spicate flowers and radical leaves ; corolla-lobes imbricate ; no disk .. .. *Plantaginaceae*
Leaves stipulate or sheathing at the base .. .. .. *Loganiaceae*
Styles with more than 1 separate stigma :
Stamens double the number of the corolla-lobes ; flowers dioecious ; endosperm copious, hard .. .. *Ebenaceae*
Stamens the same number as the corolla-lobes ; endosperm absent or very little :
Rudimentary stipules often present ; stamens and corolla-lobes 4 ; corolla-tube short ; ovary 1-celled .. .. *Salvadoraceae*
Stipules absent ; corolla-tube usually fairly long ; ovary 2–4-celled *Verbenaceae*
Leaves alternate or all radical or reduced to scales :
Leafless twining parasites destitute of chlorophyll ; flowers hermaphrodite, small, in fascicles ; corolla-tube with scales alternating with the stamens *Convolvulaceae* (Cuscuta)
Not parasitic or rarely so ; leaves more or less green and normally developed :
Leaves stipulate, stipules sometimes soon falling off :
Flowers unisexual ; petals not bifid ; ovary usually 3-lobed and 3-celled ; calyx not wing-like in fruit .. .. *Euphorbiaceae*
Flowers hermaphrodite or unisexual ; petals bifid or bilobed ; calyx not wing-like in fruit ; branches without hooks .. .. .. *Chailletiaceae*
Flowers hermaphrodite ; petals not bilobed ; ovary 1-celled, 1-ovulate ; stamens 5 or 10 ; calyx wing-like in fruit ; branches with hooks *Ancistrocladaceae*
Leaves exstipulate :
Stamens hypogynous or perigynous, free from the corolla or slightly adnate to its base :
Anthers opening by terminal pores, often with appendages ; calyx persistent, sometimes petaloid ; corolla-lobes contorted or imbricate *Ericaceae*
Anthers opening by longitudinal slits :
Stamens 4–6 :
Corolla-segments valvate ; ovules pendulous ; leaves simple *Icacinaceae*
Corolla-segments imbricate ; leaves fairly large ; flowers subumbellate, axillary ; ovules pendulous .. .. *Aquifoliaceae*
Corolla-segments imbricate ; leaves simple, very small ; flowers in slender spikes ; ovules on a basal placenta .. .. .. *Tamaricaceae*
Corolla-segments imbricate ; flowers cymose or paniculate, rarely fasciculate ; ovules erect or ascending ; leaves compound .. .. *Connaraceae*
Stamens more than 6 :
Corolla-tube fairly long ; no disk ; leaves not very small *Ebenaceae*
Corolla-tube very short ; disk present ; leaves very small *Tamaricaceae*
Stamens inserted on or adnate to the corolla-tube :
Style gynobasic :
Style 1 ; fruit composed of pyrenes or nutlets ; corolla imbricate or contorted .. .. *Boraginaceae*
Styles 2 ; fruit a capsule ; corolla plicate .. .. .. *Convolvulaceae*

Style not gynobasic, terminal :
Corolla valvate or plaited in bud (in the latter case the limb may be somewhat twisted but not truly imbricate) :
Ovules 1–4 in each ovary-cell :
Stamens inserted towards the base of the corolla-tube *Convolvulaceae*
Stamens adnate to the corolla-tube nearly their whole length *Icacinaceae* (Leptaulus)
Ovules numerous (rarely 3–6) in each ovary-cell ; stamens on the corolla-tube .. .. *Solanaceae*
Corolla imbricate :
Herbs with radical leaves and flowers in slender spikes *Plantaginaceae*
Herbs, trees or shrubs ; flowers not in slender spikes :
Ovules 1 in each cell ; trees and shrubs .. .. .. *Boraginaceae*
Ovules numerous in each cell ; herbs or small shrubs .. *Solanaceae*
Stamens fewer than the corolla-lobes ; leaves mostly opposite :
Flowers actinomorphic (regular) :
Stamen 1 ; climbing shrub ; seeds winged ; one calyx-lobe much larger than the others and petaloid .. .. *Loganiaceae*
Stamens more than 1 :
Stamens 6–8, opposite the inner lobes of the corolla ; ovules solitary in each cell ; trees or shrubs .. .. *Sapotaceae*
Stamens alternate with the corolla-lobes :
Peduncle of the inflorescence adnate to the petiole ; corolla-lobes or some of them 2-cleft .. .. *Chailletiaceae*
Peduncle not adnate to the petiole ; corolla-lobes not cleft or only slightly so :
Ovules few (1–4) in each cell of the ovary :
Disk none ; stamens 2 ; shrubs, trees or climbers ; leaves simple or pinnate *Oleaceae*
Disk present ; stamens usually 4 ; shrubs or trees ; leaves simple or digitate *Verbenaceae*
Ovules numerous :
Corolla-lobes minute, valvate, alternating with entire or 2-lobed appendages *Solanaceae*
Corolla-lobes imbricate, without appendages .. .. *Scrophulariaceae*
Flowers zygomorphic (irregular) :
Aquatic herbs with bladder-like leaves ; stamens 2 ; anthers 1-celled ; sepals 2 ; ovules on a free-basal placenta .. .. *Lentibulariaceae*
Characters not as above :
Leaves alternate, usually studded with resinous glands ; filaments free from each other .. .. *Myoporaceae*
Leaves alternate, reduced to scales ; parasitic herbs .. .. *Orobanchaceae*
Leaves opposite or verticillate or radical :
Ovary not deeply lobed ; style not gynobasic :
Ovules numerous in the whole ovary or in each cell of the ovary, or if 2 then superposed :
Leaves pinnately compound ; ovules numerous ; seeds often winged, without endosperm ; shrubs or trees .. .. *Bignoniaceae*
Leaves simple ; mostly herbaceous :
Ovules numerous ; ovary 2-celled ; seeds usually minute *Scrophulariaceae*
Ovules 1 to many ; ovary 2–4-celled ; seeds not on hook-like funicles *Pedaliaceae*
Ovules few ; ovary 2-celled ; leaves rarely all radical ; seeds on hook-like funicles .. .. *Acanthaceae*
Ovules numerous ; ovary 1- or imperfectly 2-celled ; leaves often radical *Gesneriaceae*
Ovules solitary in each cell of the ovary, or if 2 then collateral ; herbs, shrubs or trees .. .. *Verbenaceae*
Ovary deeply 4-lobed ; style gynobasic ; leaves opposite or verticillate ; flowers often in whorls ; stems usually quadrangular .. .. .. *Labiatae*

GROUP 12. *One carpel or more than one united carpels ; ovules attached to the central axis or to the base or apex of the ovary-cell ; ovary superior ; petals absent.*

Calyx absent from the hermaphrodite and often from the female flowers :
Moss-like or hepaticiform aquatic herbs with minute flowers ; ovules 2 or more in a 1-celled ovary .. .. *Podostemonaceae*
Above characters not associated :
Flowers surrounded by an involucre margined by fleshy glands ; male flowers several to numerous and each consisting of a single stamen, with a single female often stalked flower in their midst .. .. *Euphorbiaceae*

Flowers not as above :
Leaves stipulate, stipules sometimes adnate to the petiole :
Herbs or shrubs ; flowers in dense spikes .. .. .. *Piperaceae*
Trees or shrubs ; flowers on a common open receptacle, the fruit becoming immersed in it .. .. *Moraceae*
Leaves exstipulate :
Trees or shrubs with hard wood ; flowers in dense spikes ; leaves aromatic, often glandular ; mostly swamp plants .. .. *Myricaceae*
Herbs sometimes slightly woody at the base ; ovary 1-celled *Urticaceae*

Calyx always present, sometimes long and petaloid :
Moss-like or hepaticiform aquatic herbs with minute flowers ; ovules 2 or more in a 1-celled ovary .. .. *Podostemonaceae*

Above characters not associated :
Leaves opposite or verticillate, never all radical :
Leaves stipulate :
Flowers hermaphrodite :
Herbs, sometimes slightly woody at the base ; leaves mostly pinnate *Zygophyllaceae*
Trees or shrubs with reduced flowers ; leaves simple .. .. .. *Ulmaceae*
Flowers unisexual :
Ovary 2- or more-celled, often deeply lobed ; seeds usually with a distinct caruncle .. .. *Euphorbiaceae*
Ovary 1-celled ; ovary usually not lobed :
Ovule erect :
Filaments inflexed ; mostly herbaceous with fibrous stems ; juice not milky *Urticaceae*
Filaments not inflexed ; mostly trees and shrubs, rarely herbs, juice mostly milky, the flowers often minute and arranged on or inside an enlarged receptacle .. .. *Moraceae*
Ovule pendulous :
Filaments not inflexed in bud :
Fruit a drupe ; flowers monoecious or subdioecious ; trees or shrubs *Ulmaceae*
Fruit a small dry achene ; flowers dioecious ; herb .. *Cannabinaceae*
Filaments erect or inflexed in bud ; mostly trees or shrubs .. .. *Moraceae*
Leaves exstipulate :
Flowers unisexual ; ovary usually 2- or more-celled ; seeds usually with a distinct caruncle ; not aquatic .. .. *Euphorbiaceae*
Flowers unisexual ; ovary 1-celled ; fruits tuberculate, crowned with the persistent style ; aquatic submerged herb with verticillate leaves *Ceratophyllaceae*
Flowers hermaphrodite ; ovary 1-celled :
Stamens involute in bud ; calyx more or less herbaceous, often long and tubular, mostly covered with sticky glands .. .. *Nyctaginaceae*
Stamens erect in bud ; calyx more or less dry and scarious, not tubular *Amarantaceae*
Stamens erect in bud ; calyx herbaceous, tubular .. .. *Ficoidaceae*
Leaves alternate or radical or reduced to scales :
Leaves stipulate :
Stamens monadelphous, usually numerous :
Flowers usually hermaphrodite ; hairs usually stellate .. *Sterculiaceae*
Flowers always unisexual ; hairs often simple .. .. .. *Euphorbiaceae*
Stamens free or shortly connate only at the base :
Stamens the same number as the sepals and alternate with them *Rhamnaceae*
Stamens the same number as the sepals and opposite to them, or more numerous or fewer :
Stipules ochrear, i.e. sheathing and more or less membranous around the stem ; fruit a small nut .. .. *Polygonaceae*
Stipules not ochrear :
Flowers hermaphrodite ; stipules adnate to the petiole ; leaves digitately lobed ; stems herbaceous, creeping .. .. *Rosaceae*
Flowers unisexual ; stems not creeping :
Ovary 3-celled, composed of 3 carpels ; fruit a capsule .. *Euphorbiaceae*
Ovary 1-celled, composed of 1 carpel ; fruit not a capsule :
Trees or shrubs .. .. *Moraceae*
Herbs .. .. *Urticaceae*
Leaves exstipulate :
Leaves ternately compound ; herbs ; ovary composed of 1 carpel, long-stipitate in fruit ; flowers paniculate or racemose, very small .. .. *Ranunculaceae*

Leaves compound ; trees and shrubs :
Cultivated trees with milky latex ; fruit a capsule, with pendulous seeds ; flowers unisexual ; leaves digitate .. .. *Euphorbiaceae*
Indigenous trees or shrubs ; latex not milky ; leaves pinnate *Sapindaceae*
Leaves simple :
Stamens circinately involute in bud ; calyx-tube often rather long ; ovary 1-celled ; ovule 1, basal .. .. *Nyctaginaceae*
Stamens sometimes inflexed but not circinate in bud :
Stamens more or less connate into a central column ; ovule erect ; seeds with ruminate endosperm .. .. *Myristicaceae*
Stamens free or the filaments shortly connate only at the base :
Stamens distinctly perigynous ; sepals more or less connate into a tube below
Twiners ; flowers in axillary spikes, racemes or panicles ; ovule solitary, basal .. .. *Basellaceae*
Herbs ; calyx herbaceous ; flowers small or minute ; ovule 1 *Chenopodiaceae*
Trees or shrubs, not twining :
Calyx mostly long and petaloid, rarely short and deeply divided ; anthers opening by slits :
Leaves frequently small and evergreen ; stamens definite *Thymelaeaceae*
Leaves rather large ; flowers in large bracteate heads .. .. *Proteaceae*
Calyx short ; leaves usually large, rarely reduced ; stamens in 2–4 rows ; anthers opening by valves .. .. *Lauraceae*
Stamens hypogynous or slightly perigynous if accompanied by a disk :
Flowers arranged in an involucre (cyathium) margined by glands ; male flower reduced to a single stamen, the female to a single stipitate ovary *Euphorbiaceae*
Flowers not as above ; stamens more than 1 :
Trees or shrubs :
Leaves glandular ; flowers in catkin-like spikes or racemes ; berry often warted .. .. *Myricaceae*
Leaves not glandular ; flowers not in catkin-like inflorescences :
Flowers unisexual ; ovules solitary, pendulous ; seed with straight embryo .. .. *Euphorbiaceae*
Flowers unisexual or polygamous ; ovules 2 in each cell, collateral or the lower ascending ; embryo spirally twisted .... *Sapindaceae*
Herbs ; calyx scarious ; flowers often in spikes or heads ; ovule 1 in a 1-celled ovary .. .. *Amarantaceae*
Herbs ; calyx herbaceous ; flowers small or minute ; ovule 1 *Chenopodiaceae*

GROUP 13.—*One carpel or more than one united carpels ; ovules attached to the central axis or to the base or apex of the ovary-cell ; ovary inferior ; petals present, free from each other.*

Leaves opposite or verticillate, never all radical, rarely reduced to scales (to p. 39) :
Leaves stipulate :
Stamens the same number as and opposite the petals .. .. *Rhamnaceae*
Stamens alternate with the petals or more numerous :
Ovary composed of 2–6 carpels, 2–6-celled ; ovules pendulous ; mostly maritime trees or shrubs .. .. *Rhizophoraceae*
Ovary various ; ovules ascending or attached to the central axis ; trees, shrubs or herbs .. .. *Rosaceae*
Leaves exstipulate :
Trees, shrubs or climbers :
Stamens numerous ; leaves gland-dotted ; style simple with a small capitate stigma or rarely 3–4-lobed .. .. *Myrtaceae*
Stamens as many to twice as many as the petals :
Stamens the same number as and opposite the petals ; mostly parasitic shrubs or trees ; calyx usually much reduced .. .. *Loranthaceae*
Stamens the same number as and alternate with the petals or more numerous :
Anthers opening by a terminal pore ; filaments often jointed ; leaves often with 3–9 longitudinally parallel nerves .. .. *Melastomataceae*
Anthers opening by longitudinal slits ; calyx mostly valvate ; ovules 2 or more ; fruits mostly winged ; endosperm absent : flowers in heads, spikes, racemes or panicles .. .. *Combretaceae*
Herbs :
Anthers opening by a terminal pore ; leaves mostly with longitudinally parallel nerves ; filaments often jointed .. .. *Melastomataceae*

Anthers opening by longitudinal slits :
Ovules numerous on placentas pendulous from the apex of the 1-celled ovary *Saxifragaceae*
Ovules 1–4, pendulous from the top of the ovary cells .. .. *Halorrhagaceae*
Leaves alternate or all radical :
Flowers unisexual :
Flowers mostly zygomorphic ; stamens mostly indefinite in number ; no tendrils ; stipules paired .. .. *Begoniaceae*
Flowers actinomorphic ; stamens definite or rarely many, usually 3 ; anthers often curved or twisted ; tendrils present or absent ; no stipules *Cucurbitaceae*
Flowers hermaphrodite :
Stamens numerous ; fruits broadly winged .. .. *Lecythidaceae*
Stamens definite in relation to the sepals and petals or sometimes fewer :
Leaves stipulate :
Herbs :
Leaves usually compound or much dissected, sometimes peltate ; sepals very small ; fruit composed of 2 indehiscent mericarps .. .. *Umbelliferae*
Leaves simple :
Stamens opposite the petals ; stipules laciniate .. .. *Portulacaceae*
Stamens 10, one series alternate with the petals ; stipules entire .. *Rosaceae*
Trees or shrubs :
Stamens the same number as and opposite the petals ; leaves entire or toothed *Rhamnaceae*
Stamens alternate with the petals or more numerous or fewer ; flowers mostly in umbels ; leaves compound, rarely simple ; fruit a berry or drupe *Araliaceae*
Leaves exstipulate :
Stamens as many as and opposite the petals ; corolla usually brightly coloured ; often parasitic on other trees and shrubs .. .. .. *Loranthaceae*
Stamens alternate with the petals or more numerous ; not parasitic :
Herbs :
Ovules more than 1 in each ovary-cell ; ovary mostly 4-celled *Onagraceae*
Ovules 4 in a 1-celled ovary ; flowers monoecious or polygamous, not umbellate *Halorrhagaceae*
Ovules solitary in each cell, usually pendulous ; flowers umbellate ; carpels separating in fruit into 2 indehiscent mericarps .. .. *Umbelliferae*
Shrubs or trees :
Leaves simple :
Petals entire or at most toothed ; ovary 1-celled :
Petals more or less obovate, clawed ; fruits winged .. *Combretaceae*
Petals linear ; fruit a berry .. .. *Alangiaceae*
Petals entire, 2-lobed or laciniate, often involute ; ovary 4-celled *Rhizophoraceae*
Leaves 3-foliolate ; petals 5 ; stamens 5, alternating with glands ; anthers opening by valves .. .. *Hernandiaceae*

GROUP 14.—*One carpel or more than one united carpels ; ovules attached to the central axis or to the base or apex of the ovary-cell ; ovary inferior ; petals present, more or less united.*

Leaves opposite (to p. 40) :
Leaves stipulate, entire, stipules mostly inter- or intra-petiolar ; anthers free from each other ; corolla always actinomorphic .. .. *Rubiaceae*
Leaves exstipulate :
Anthers free from each other ; ovules mostly pendulous :
Leaves not gland-dotted ; mostly herbaceous plants, rarely shrubs ; stamens definite :
Herbaceous or woody only at the base ; not parasitic ; flowers often in heads surrounded by bracts .. .. *Dipsacaceae*
Shrubs, mostly parasitic on trees ; flowers usually not in heads and not surrounded by bracts .. .. *Loranthaceae*
Leaves gland-dotted ; stamens mostly numerous ; trees or shrubs ; flowers cymose or fasciculate .. .. *Myrtaceae*
Anthers mostly connivent around the style :
Ovule solitary, erect ; flowers mostly in heads surrounded by an involucre of bracts *Compositae*
Ovules numerous ; flowers usually not in heads and not surrounded by bracts *Campanulaceae*

Leaves alternate or radical :
Anthers free from one another ; flowers not in a head :
Stamens the same number as and opposite the corolla-lobes :
Herbaceous ; leaves not gland-dotted .. .. *Primulaceae*
Trees or shrubs :
Not parasitic ; leaves often gland-dotted ; corolla short .. *Myrsinaceae*
Often parasitic ; leaves not gland-dotted ; corolla often long .. *Loranthaceae*
Stamens alternate with the corolla-lobes or more numerous or fewer :
Herbaceous plants with often milky juice, or herbaceous climbers :
Flowers hermaphrodite ; stems not climbing ; anthers straight :
Corolla not split down one side .. .. *Campanulaceae*
Corolla split down one side .. .. *Goodeniaceae*
Flowers unisexual ; stems often climbing by tendrils ; anthers often sinuous or twisted .. .. *Cucurbitaceae*
Woody trees, shrubs or climbers :
Stems without hooks ; petals valvate .. .. *Lecythidaceae*
Stems with hooks ; petals contorted .. .. *Ancistrocladaceae*
Anthers united into a ring around the style or flowers in a head :
Flowers not in heads surrounded by a common involucre .. .. .. *Lobeliaceae*
Flowers in heads surrounded by a common involucre .. .. *Compositae*

GROUP 15.—*One carpel or more than one united carpels ; ovules attached to the central axis or to the base or apex of the ovary-cell ; ovary inferior ; petals absent.*

Parasitic herbs destitute of chlorophyll, the leaves reduced to scales ; ovules nude or with a single integument ; flowers densely crowded ; fruit nut-like, 1-seeded *Balanophoraceae*
Not parasitic, or if so then more or less woody and often with normally developed leaves :
Leaves stipulate :
Flowers unisexual :
Stamens and ovules numerous ; fruit often winged ; herbs with often obliquely shaped leaves .. .. *Begoniaceae*
Stamens few ; ovule solitary ; trees or shrubs .. .. *Moraceae*
Flowers hermaphrodite ; stamens the same number as and alternate with the sepals *Rhamnaceae*
Leaves exstipulate :
Ovules pendulous from the apex of the ovary or from the apex of a basal placenta :
Not parasitic ; stamens inflexed in bud, often double the number of the sepals ; fruits often winged .. .. *Combretaceae*
Mostly parasitic ; flowers small and leaves often reduced ; stamens erect in bud, the same number as and opposite the sepals ; fruit not winged *Santalaceae*
Ovule 1, erect ; mostly parasitic ; flowers often brightly coloured *Loranthaceae*

ARTIFICIAL KEY TO THE FAMILIES OF MONOCOTYLEDONES REPRESENTED IN THIS FLORA

Flowers very small, arranged on a *spadix*, more or less enclosed by a green or coloured spathe ; erect, creeping or climbing herbs ; rootstock often tuberous or thick and fleshy .. .. *Araceae*
Flowers not arranged as above or rarely so and then other characters not associated :
Small or minute floating plants not differentiated into stem and leaves and with much-reduced flowers consisting of 1–2 stamens and a sessile ovary either naked or enclosed in a membranous spathe ; anthers 1–2-celled ; ovary 1-celled ; ovule 1 or more on a basal placenta .. .. *Lemnaceae*
Characters not as above ; if aquatic plants then usually with well-developed leaves :
Ovary apocarpous, of more than 1 carpel (to p. 41) :
Submerged aquatic plants :
Perianth-segments 1–3, white or coloured .. .. .. *Aponogetonaceae*
Perianth-segments 4 and herbaceous, or absent .. .. .. *Potamogetonaceae*
Not aquatic, or if so then not submerged :
Carpels indehiscent ; ovules 1 to few, basal or on the inner angle of the carpel ; marsh or aquatic herbs .. .. *Alismataceae*
Carpels dehiscent ; ovules numerous on reticulately branched parietal placentas ; scapigerous marsh herbs with milky juice ; stamens usually 9 *Butomaceae*
Carpels dehiscent, numerous ; ovule solitary, erect from the base ; leafless herbs ; stamens 2–6 .. .. *Triuridaceae*
Carpels or fruit indehiscent ; trees or shrubs with simple stems and usually large often flabellate leaves .. .. *Palmae*

Ovary syncarpous or carpel solitary :
Ovary superior :
Anthers opening by a terminal pore .. .. *Rapateaceae*

Anthers opening by longitudinal slits :
Flowers in the axils of membranous or more or less dry bracts (glumes) arranged in spikelets mostly in spikes, racemes, panicles or heads ; ovary 1-celled, 1-ovuled ; perianth of small scales or bristles or absent :
Stems usually triangular, solid and without nodes ; leaf-sheaths mostly closed all round the stem and usually without a ligule ; filament often attached to the base of the anther ; ovule basal ; seed free from the pericarp *Cyperaceae*
Stems mostly cylindrical and hollow between the nodes ; leaf-sheaths nearly always split down one side and often terminating in a distinct ligule ; filament usually attached to the back of the anther ; ovule attached laterally ; seed more or less adnate to the pericarp .. .. *Gramineae*

Flowers usually with a distinct perianth or at any rate not in spikelets, etc., as above ; ovary usually more than 1-celled :
Flowers mostly hermaphrodite or if unisexual then not collected into involucrate heads or dense spikes :
Ovules on parietal placentas ; fertile stamens 3 :
All the perianth-segments petaloid ; aquatic herbs ; stamens 3 or 1 *Pontederiaceae*
Outer perianth-segments glumaceous, inner petaloid ; herbs ; stamens 3 *Xyridaceae*

Ovules on axile or basal placentas ; fertile stamens usually 6 :
Perianth present :
Perianth-segments 2-seriate, the outer herbaceous, the inner petaloid :
Herbs ; leaf-bases sheathing .. .. *Commelinaceae*
Tall plants with single stems and usually large leaves ; flowers very small *Palmae*

Perianth-segments all more or less petaloid :
Aquatic floating herbs with long petioles sheathing at the base ; 3 upper stamens included, 3 lower ones more or less exserted *Pontederiaceae*
Not aquatic or rarely subaquatic ; stamens 6, more or less equal ; leaves not fibrous .. .. *Liliaceae*
Not aquatic ; leaves flat or cylindric, very fibrous *Haemodoraceae*

Perianth-segments sepaloid or glumaceous :
Climbing herbs, most of the lanceolate leaves ending in a tendril ; fruit succulent or drupaceous ; embryo outside the endosperm *Flagellariaceae*
Low herbs ; leaves linear or reduced to a sheath ; fruit a 3-valved capsule ; embryo enclosed in the endosperm .. .. *Juncaceae*
Perianth absent or very rudimentary ; carpel 1 ; submerged aquatics with branched, filiform, smooth or muricate stems ; flowers dioecious or monoecious, axillary, small .. .. *Naiadaceae*

Flowers unisexual, collected into involucrate heads or dense spikes :
Flowers in dense involucrate heads ; low herbs, often stemless with mostly densely-crowded leaves .. .. *Eriocaulaceae*
Flowers with distinct perianth ; usually tall, single-stemmed plants with pinnatisect or flabellate leaves .. .. *Palmae*
Flowers in spadices, with very rudimentary or no perianth ; trees or shrubs, the stems bearing thick aerial roots .. .. *Pandanaceae*
Flowers in dense cylindric spikes ; aquatic herbs with linear, alternate leaves and creeping rhizomes .. .. *Typhaceae*

Ovary inferior :
Stamens 3–6 (to p. 42) :
Ovules parietal :
Leaves not divided ; stigma not umbrella-shaped ; flowers hermaphrodite or unisexual .. .. *Hydrocharitaceae*
Leaves divided ; stigma umbrella-shaped ; leaves large, divided *Taccaceae*

Ovules axile, basal or apical :
Perianth-lobes or -segments 3–6 :
Stamens 6 or 3 ; flowers very small, dioecious ; stems climbing *Dioscoreaceae*

Stamens 6 ; flowers conspicuous, hermaphrodite ; stems not climbing :
Ovary wholly inferior ; anthers opening by a slit ; flowers usually fairly large and showy .. .. *Amaryllidaceae*
Ovary semi-inferior ; anthers opening by a terminal pore ; flowers usually rather small .. .. *Haemodoraceae*

Stamens 3 ; not climbing :
Stamens inserted opposite the outer perianth-segments .. .. *Iridaceae*
Stamens inserted opposite the inner perianth-segments .. *Burmanniaceae*
Perianth-segment 1 ; stamens 5, rarely 6 ; leaves with pinnate nervation ; tall plants .. .. *Musaceae*
Stamen 1 :
Flowers asymmetric :
Anthers 2-celled ; ovules numerous ; perianth-segments united below .. *Zingiberaceae*
Anthers 1-celled :
Ovules many in each cell ; petiole not thickened .. .. .. *Cannaceae*
Ovules solitary in each cell ; petiole thickened towards the top *Marantaceae*
Flowers very zygomorphic ; ovules numerous ; androecium united with the gynaecium into a column ; anther sessile or subsessile on the column *Orchidaceae*

NOTE ON THE SYSTEM ADOPTED FOR THIS FLORA

The system here adopted is intended to show *phylogenetic* relationships, i.e. a system which indicates, so far as possible in a linear sequence, the possible path of descent of the families of Flowering Plants. In a local Flora such as this, there are, of course, many missing links in the chain. The *Gymnosperms*, in which the ovules are exposed and are not enclosed in an ovary, take precedence of the *Angiosperms*, which have the ovules enclosed in an ovary (see p. 24).

The general theory upon which this new system is based (for complete scheme see reference on p. 25) is that the *less specialised* flowers and inflorescences such as those of *Magnoliaceae*[1] and *Ranunculaceae* are the more primitive. In these there are well-developed *petals*, and the calyx, petals and stamens are *hypogynous*, that is, in position on the floral axis they are all *below* the gynaecium, or pistil. These flowers are mostly solitary, they have usually numerous stamens and carpels, and all or some of the organs are arranged in *spirals* and are free from one another, there being neither cohesion nor adhesion of parts. The most primitive *woody* family of Angiospermous flowering plants represented in Africa is *Anonaceae* (p. 46), which is an advance on the more temperate *Magnoliaceae*,[1] because the sepals and petals are arranged in whorls of three.

So the flowering plants are arranged in several small groups or *phyla*, in each of which the most primitive families will be found at the beginning, the more advanced about the middle and the most advanced or the most reduced at the end. Here we should remember that evolution has been both *forwards* and *backwards* ; that whilst some flowers have been developing new structures, other have dispensed with some. Good examples are those with *united* petals and *without* petals respectively. It will thus be evident that the family at the end of one *phylum* will not necessarily be closely related to the family at the beginning of the next *phylum*. To show this break in affinity, horizontal lines are inserted in the list on p. 43. It should also be noted that the basal family placed at the beginning of each phylum is generally more advanced than the basal family placed at the beginning of the phylum preceding it. Thus *Papaveraceae* (No. 14) are more advanced than *Ranunculaceae* (No. 8), *Linaceae* (No. 36) more advanced than *Crassulaceae* (No. 22), and so on.

[1] Not represented in Africa.

PHYLOGENETIC SEQUENCE OF ORDERS (COHORTS) AND FAMILIES CONTAINED IN VOLUME I.

(The cross-lines show breaks in affinity)

GYMNOSPERMAE

1. Cycadaceae
2. Gnetaceae

ANGIOSPERMAE

DICOTYLEDONES

ARCHICHLAMYDEAE

ANONALES

3. Anonacae

LAURALES

4. Monimiaceae
5. Lauraceae
6. Hernandiaceae
7. Myristicaceae

RANALES

8. Ranunculaceae
9. Ceratophyllaceae
10. Nymphaeaceae

BERBERIDALES

11. Menispermaceae

ARISTOLOCHIALES

12. Aristolochiaceae

PIPERALES

13. Piperaceae

RHOEADALES

14. Papaveraceae

LOASALES

15. Turneraceae

CAPPARIDALES

16. Capparidaceae
17. Moringaceae

CRUCIALES

18. Cruciferae

VIOLALES

19. Violaceae
20. Resedaceae

POLYGALALES

21. Polygalaceae

SAXIFRAGALES

22. Crassulaceae
23. Saxifragaceae

SARRACENIALES

24. Droseraceae

PODOSTEMONALES

25. Podostemonaceae

CARYOPHYLLALES

26. Elatinaceae
27. Caryophyllaceae
28. Molluginaceae
29. Ficoidaceae
30. Portulacaceae

POLYGONALES

31. Polygonaceae

CHENOPODIALES

32. Phytolaccaceae
33. Chenopodiaceae
34. Amarantaceae
35. Basellaceae

GERANIALES

36. Linaceae
37. Zygophyllaceae
38. Geraniaceae
39. Oxalidaceae
40. Balsaminaceae

LYTHRALES

41. Lythraceae
42. Onagraceae
43. Halorrhagaceae

THYMELAEALES

44. Thymelaëaceae
45. Nyctaginaceae

PROTEALES
46. Proteaceae

DILLENIALES
47. Dilleniaceae

PITTOSPORALES
48. Pittosporaceae

BIXALES
49. Bixaceae
50. Cochlospermaceae
51. Flacourtiaceae
52. Samydaceae

TAMARICALES
53. Frankeniaceae
54. Tamaricaceae

PASSIFLORALES
55. Passifloraceae

CUCURBITALES
56. Cucurbitaceae
57. Begoniaceae

CACTALES
58. Cactaceae

THEALES
59. Ochnaceae
60. Ancistrocladaceae
61. Dipterocarpaceae

MYRTALES
62. Myrtaceae
63. Lecythidaceae
64. Melastomataceae
65. Combretaceae
66. Rhizophoraceae

GUTTIFERALES
67. Hypericaceae
68. Guttiferae

TILIALES
69. Scytopetalaceae
70. Tiliaceae
71. Sterculiaceae
72. Bombacaceae

MALVALES
73. Malvaceae

MALPIGHIALES
74. Malpighiaceae
75. Humiriaceae
76. Erythroxylaceae

EUPHORBIALES
77. Euphorbiaceae

ROSALES
78. Rosaceae
79. Chailletiaceae

LEGUMINOSAE
80. Caesalpiniaceae
81. Mimosaceae
82. Papilionaceae

SALICALES
83. Salicaceae

MYRICALES
84. Myricaceae

URTICALES
85. Ulmaceae
86. Moraceae
87. Urticaceae
88. Cannabinaceae

CELASTRALES
89. Celastraceae
90. Pandaceae
91. Hippocrateaceae
92. Icacinaceae
93. Salvadoraceae

OLACALES
94. Olacaceae
95. Pentadiplandraceae
96. Opiliaceae

SANTALALES
97. Loranthaceae
98. Santalaceae
99. Balanophoraceae

RHAMNALES
100. Rhamnaceae
101. Ampelidaceae

RUTALES
102. Rutaceae
103. Simarubaceae
104. Burseraceae

MELIALES
105. Meliaceae

SAPINDALES
106. Sapindaceae
107. Melianthaceae
108. Anacardiaceae
109. Connaraceae

UMBELLIFLORAE
110. Alangiaceae
111. Araliaceae
112. Umbelliferae

GYMNOSPERMAE

1. CYCADACEAE

Shrubs or small trees with thick, usually simple stems and a crown of pinnatisect leaves circinate in bud; leaflets often with spiny teeth. Cones dioecious. Males terminal or subterminal, composed of numerous leathery or fleshy flat or peltate scales bearing on the under-surface numerous pollen-sacs. Female cones similar, the scales bearing a pair of inverted nude ovules on the lower side. Seeds large, drupe-like, with copious endosperm; cotyledons 2.

The most ancient of the families of Gymnosperms, only one species represented in our area; mainly found in S. Africa, Australia and Central America.

ENCEPHALARTOS Lehm.—F.T.A. 6, 2: 346.

Stem very short, ellipsoid; leaves pinnatisect, 1–2 m. long, up to about 25 cm. wide; segments up to about 80 pairs, linear-lanceolate, very acute, with a few spinulose teeth on the margin, and numerous close parallel nerves; male cones pedunculate, pale green, 30–40 cm. long including the stalk; female cones subsessile, up to 25 cm. long; seeds crimson when ripe .. .. *Barteri*

E. Barteri *Carruth.*—F.T.A. 6, 2: 348; Bot. Mag. t. 8232. Stem rarely over 1 ft. high and 9 in. across, covered with persistent leaf-bases clothed with cottony indumentum.
Gold Coast: Krobo! Kwahu! Anum! Drome! Labolabo! Aburi! Dahomey: Borgu! N. Nigeria: Jebba, 800 ft.! Exsicc.—*Barter* 1692. *Chipp* 624, and others.

2. GNETACEAE[1]

Erect or scandent shrubs or a woody plant of unique form (*Welwitschia*); leaves opposite in our species, simple. Flowers in catkin-like spikes, usually

FIG. 9.—GNETUM BUCHHOLZIANUM *Engl.*
A, male spike. B, female spike. C, female flower.

[1] This description applies mainly to the genus *Gnetum*.

dioecious ; spikes jointed, with the flowers in whorls. Male flowers with a tubular envelope of 2 connate scales ; anthers 2 or 1, sessile on the summit of a central column. Female flowers with a close-fitting utricle resembling an ovary ; ovule otherwise naked, integument produced into a straight micropylar tube exserted through the orifices of the aril and utricle, truncate, toothed or fimbriate. Seed with copious endosperm.

A small and probably unnatural family widely distributed in the tropics and warmer regions.

GNETUM Linn.—F.T.A. 6, 2 : 330.

A climber ; internodes 5–6 cm. long ; leaves ovate-elliptic or broadly elliptic, rounded or very slightly cuneate at the base, abruptly acuminate, 9–14 cm. long, 4–7 cm. broad, papery, glabrous, with about 6 pairs of lateral nerves prominent below and looped ; petiole 1 cm. long, sometimes twining ; male spikes lateral or terminal, solitary, shortly pedunculate, about 3–4 cm. long ; joints about 8 mm. apart ; female spikes shorter than the male .. .. *Buchholzianum*

G. **Buchholzianum** *Engl.* Bot. Jahrb. 40 : 519 (1908).
S. Nigeria : Johann-Albrechtshöhe ! Also in French Cameroons. Exsicc.—*Staudt* 543.

ANGIOSPERMAE

DICOTYLEDONES

ARCHICHLAMYDEAE

3. ANONACEAE

With T. F. Chipp

Trees, shrubs or climbers, aromatic. Leaves alternate, entire, exstipulate. Flowers terminal, leaf-opposed or axillary, solitary or crowded, hermaphrodite or rarely unisexual, mostly trimerous. Sepals 3, rarely 2, separate or united into a 3-lobed calyx, valvate or rarely imbricate, persistent or deciduous. Petals generally 6, in two series, valvate or slightly imbricate, rarely in two series of 2, or the inner series absent. Stamens generally numerous, hypogynous ; anther-cells adnate, with the connective often truncate. Carpels numerous or rarely few or solitary, free or very rarely united into a 1-celled ovary with parietal placentas ; ovules 1 or more. Fruiting carpels sessile or stipitate, mostly indehiscent. Seed with or without an aril, with copious ruminate endosperm and minute embryo.

Mainly in tropical and subtropical regions. Recognised by the alternate, exstipulate leaves, mostly trimerous flowers, numerous and often truncate free stamens, free carpels, and seeds with ruminate endosperm.

Carpels spirally arranged, free or if united forming a many-celled syncarp ; stigmas erect ; petals free or rarely slightly united at the base :
Petals always in two series, both or only the inner series imbricate ; indumentum of the leaves usually stellate or lepidote :
Carpels free from one another, at least in fruit :
Ovules numerous ; petals of both series more or less similar, the inner ones at length spreading .. .. **1. Uvaria**
Ovules 1–2 ; outer petals spreading, the inner ones much shorter and closely appressed over the stamens and carpels .. .. **2. Cleistopholis**
Carpels united, especially in fruit :
Ovules numerous ; indumentum stellate .. .. .. **3. Pachypodanthium**
Ovule 1 ; indumentum not stellate ; anthers linear ; connective truncate, pubescent **4. Anonidium**
Petals all valvate, either in two distinct series or rarely in one series, usually 6, rarely 4 or 3 :
Outer 3 petals much smaller than the inner ones and scarcely distinguishable from the sepals ; inner petals elongated ; styles united .. .. **5. Piptostigma**

Outer 3 petals as large or larger than the inner, and distinct from the sepals, or petals in only 1 series :
Carpels not united or if slightly so then always quite free in fruit :
Petals 6 :
Ovules numerous (more than 2) in each carpel :
Petals of the two series similar and approximately of equal size, usually free from each other, the inner ones spreading or erect :
Anthers not transversely septate :
Petals free : carpels 3–4 ; stigma capitate .. .. 6. **Alphonseopsis**
Petals united into a tube at the base, transversely plicate in bud ; styles deeply bilobed, lobes clavate .. .. 7. **Hexalobus**
Anthers transversely septate ; styles uniting into a central column 8. **Xylopia**
Petals of the two series somewhat dissimilar, the inner ones connivent over the stamens and carpels ; stigma bilobed .. .. .. 12. **Popowia**
Petals of the two series very dissimilar and usually very unequal in length, free from each other ; inner petals not clawed, contiguous from base to apex, erect in the open flower .. .. 9. **Uvariastrum**
Ovules 1–2 in each carpel :
Peduncles leaf-opposed, becoming indurated, thickened and hook-like ; petals with a dorsal horn-like appendage ; climbing shrubs .. 10. **Artabotrys**
Peduncles not hooked :
Petals subequal :
Buds oblong ; all the petals more or less opening out in flower 11. **Polyalthia**
Buds subglobose ; inner petals remaining more or less incurved over the stamens and carpels and often somewhat connivent ; stigma bilobed 12. **Popowia**
Petals very unequal :
Petals with a contracted concave base ; flowers extra-axillary 13. **Stenanthera**
Petals not contracted at the base .. .. 14. **Oxymitra**
Petals 4 : flowers dioecious, in fascicles on the main branches 15. **Tetrastemma**
Petals 3 :
Ovules about 10 in each carpel ; petals alternate with the sepals 16. **Dennettia**
Ovule solitary ; petals opposite the sepals .. .. .. 17. **Enantia**
Carpels united into a fleshy mass in fruit .. .. 18. **Anona**
Carpels in a single whorl, united into a 1-celled ovary with parietal placentas ; stigmas radiating ; petals more or less united into a tube :
Corolla-lobes all alike, small ; corolla-tube funnel-shaped .. .. .. 19. **Isolona**
Corolla-lobes dissimilar, the outer larger and often with wavy margins, the inner smaller and entire or with lateral lobes ; corolla-tube short .. 20. **Monodora**

1. UVARIA Linn.—Engl. & Diels Monogr. Afr. Anonac. 7.

Mature leaves (and often the branchlets) glabrous on the lower surface or rarely slightly hairy on the midrib :
Leaves very large (about 35–50 cm. long), elongate-obovate, often oblique, with numerous (more than 15) pairs of lateral nerves :
Flowers borne in clusters on the older leafless branchlets or on the stem ; leaves up to 50 cm. long and 15 cm. broad, shortly acuminate, glabrous below ; petiole stout, glabrous, about 1 cm. long ; sepals covering the petals in bud, ovate-triangular, about 1·5 cm. long, appressed-tomentose outside .. .. 1. *fusca*
Flowers on the leafy shoots, shortly pedicellate ; leaves up to 35 cm. long and 12 cm. broad, slightly arcuate, abruptly acutely acuminate, glabrous below ; petiole verrucose, thickened, about 1 cm. long ; sepals shorter than the petals in bud, about 1 cm. long, shortly tomentellous outside .. .. 2. *connivens*
Leaves usually much smaller than above, usually with not more than about 12 pairs of lateral nerves :
Flowers borne on the older leafless branchlets or on the stem :
Flowers sessile or subsessile :
Leaves oblanceolate, acute at both ends, 12–15 cm. long, 3–4·5 cm. broad, silky when very young, soon glabrous ; lateral nerves 8–10 pairs, ascending, prominent below ; petiole 0·5 cm. long .. .. 3. *angustifolia*
Leaves elongate-elliptic, obtuse at the base, shortly acuminate, about 16 cm. long and 6·5 cm. broad, glabrous ; lateral nerves about 14 pairs, spreading, very prominent below ; petiole 5–10 mm. long .. .. 4. *Mannii*
Flowers pedicellate ; branchlets glabrous ; leaves obovate-oblanceolate, obtuse at the base, gradually acuminate, 15–21 cm. long, 5–6·5 cm. broad, glabrous ; lateral nerves about 10 pairs, prominently looped well within the margin ; petiole 3 mm. long ; fruiting pedicels 6·5 cm. long, stout ; carpels sessile, up to 4·5 cm. long, glabrous .. .. 5. *spectabilis*

FIG. 10.—ANONACEAE.

A, Alphonseopsis parviflora *Bak. f.*, stamen. B1, Cleistopholis patens *Benth.*, flower; B2, stamen. C1, Anonidium Mannii *Engl. & Diels*, flower; C2, stamen. D1, Xylopia acutiflora *A. Rich.*, twig with leaves and flower-buds; D2, stamen with septate anther, from front and side. E1, Monodora tenuifolia *Benth.*, flower; E2, inner petal; E3, stamen. F1, Monodora Myristica *Dun.*, fruit; F2, cross-section of same. G1, Uvaria Dinklagei *Engl. & Diels*, flower; G2, anther. H, Oxymitra gracilis *Sprague & Hutch.*, fruit. I1, Hexalobus crispiflorus *A. Rich.*, flower; I2, stamen; I3, fruiting torus with one carpel attached. J1, Pachypodanthium Staudtii *Engl. & Diels*, flower-bud; J2, fruit. K1, Piptostigma pilosum *Oliv.*, flower; K2, stamen. Partly after Engler.

Flowers borne on the leafy branchlets :
Leaves usually well over 6 cm. long and 3 cm. broad, rounded or subcordate at the base :
Leaves broadly elliptic, with 12–15 pairs of lateral nerves, acutely acuminate, about 25 cm. long and 13 cm. broad, pubescent when young ; pedicels 2 cm. long, tomentose ; sepals about half as long as the petals .. .. .. 6. *latifolia*
Leaves elliptic or oblong-elliptic, with not more than about 10 pairs of lateral nerves :
Leaves about 15 cm. or more long, 6–11 cm. broad, more or less cordate at the base, with a cartilaginous margin ; petiole about 0·7 cm. long ; pedicel 2 cm. long ; inner petals glabrous .. .. 7. *obanensis*
Leaves usually less than 10 cm. long, rounded at the base :
Venation prominent on the upper surface ; leaves elliptic, obtusely acuminate, 3–5 cm. broad, shining ; fruits obliquely sulcate, stipitate, 4 cm. long 8. *tortilis*
Venation not prominent on the upper surface :
Fruits not very echinate :
Fruiting carpels almost sessile .. .. 9. *nigrescens*
Fruiting carpels distinctly stipitate .. .. 10. *Chamae*
Fruits markedly echinate .. .. 11. *cristata*
Leaves not more than about 4 cm. long and 2 cm. broad, slightly narrowed at the base, with very few and faint lateral nerves ; branchlets stellate-tomentose ; fruits shortly pedicellate ; carpels shortly stipitate, broadly ellipsoid or subglobose, closely stellate-tomentellous, up to 1·5 cm. long .. .. 12. *ovata*
Mature leaves (and often the branchlets) more or less pubescent or scabrid on the lower surface :
Leaves rounded and emarginate at the apex, subcordate at the base, elliptic, 4–6·5 cm. long, 2·5–4 cm. broad, finely pubescent below ; lateral nerves about 5 pairs ; petiole short, like the branchlets closely pilose ; older branchlets markedly reticulate-areolate ; flowers on pedicels about 1 cm. long ; young fruiting carpels stipitate, glabrous .. .. 13. *Farquharii*
Leaves more or less acuminate or acute :
Leaves clothed with rather long simple or subsimple hairs on the lower surface ; branchlets often clothed with the same type of hairs :
Lateral nerves up to 8 pairs or very obscure ; leaves up to 9 cm. long :
Fruiting carpels globose, sessile or nearly so ; leaves oblong-lanceolate, 1·5–2·5 cm. broad ; lateral nerves obscure .. .. 14. *globosa*
Fruiting carpels ovoid or ellipsoid, stipitate ; leaves oblong-elliptic, 3–4 cm. broad ; lateral nerves very prominent below .. .. .. 15. *cordata*
Lateral nerves 10–12 pairs, very prominent below ; leaves over 10 cm. long ; branchlets and leaves bristly-pilose :
Outer petals 2·5 cm. long, longer than the inner, longitudinally nervose ; leaves 12–20 cm. long .. .. 16. *Caillei*
Outer petals about 1 cm. long, equal to the inner ones ; leaves 10–13 cm. long 17. *Thomasii*
Lateral nerves 15–20 pairs ; leaves oblong, subcordate at the base, 8–10 cm. long, about 3 cm. broad, densely tomentellous with long and short stellate hairs below ; fruiting carpels long-stipitate, obliquely globose, stellate-tomentose 18. *Baumannii*
Leaves scabrid, or pubescent with stellate hairs ; branchlets usually also with short indumentum :
Leaves obovate, narrowed to a subacute base, acutely acuminate, 6–15 cm. long, 2–5·5 cm. broad, softly stellate-pubescent beneath ; lateral nerves 8–10 pairs ; pedicels 1·5 cm. long, tomentellous ; petals subequal, about 1 cm. long, tomentellous .. .. 19. *Dinklagei*
Leaves rounded at the base :
Petals oblong-lanceolate, about 4 cm. long and 1·3 cm. broad, rather densely stellate-pubescent outside ; leaves oblong, rounded or obtuse at the apex, 6–9 cm. long, 4–5 cm. broad, rather densely stellate-pubescent below ; flowers few in a cluster ; pedicels 7–8 mm. long .. .. 20. *sofa*
Petals more or less ovate to rounded, not exceeding 3 cm. long :
Petals suborbicular, very concave ; leaves obovate-elliptic or elliptic :
Leaves densely stellate-scabrid below .. .. 21. *Doeringii*
Leaves very sparingly scabrid below .. .. 22. *anonoides*
Petals more or less ovate and flat or nearly so ; leaves oblong or elliptic :
Fruiting carpels long-stipitate ; indumentum of rather longish hairs 23. *Afzelii*
Fruiting carpels sessile ; indumentum short and scabrid .. 24. *scabrida*

1. **Uvaria fusca** *Benth.*—F.T.A. 1 : 20. A tree, up to 60 ft. high.
S. Nigeria : Akassa ! Brass ! Fernando Po ! Also in Cameroons. Exsicc.—*Mann* 308. *Barter* 30 ; 2097.
2. **U. connivens** *Benth.*—F.T.A. 1 : 20. *U. megalantha* Diels. A medium-sized tree, about 40 ft. high.
S. Nigeria : Oban ! Ambas Bay (Feb.) ! Fernando Po ! Also in French Cameroons. Exsicc.—*Mann* 763 ; 1159. *Talb.* 60 ; 62 ; 82 ; 433 ; 1254.
3. **U. angustifolia** *Engl. & Diels* Monogr. Afr. Anonac. 10. A medium-sized tree, 15–40 ft. high.
S. Nigeria : Johann-Albrechtshöhe (Mar.) ! Exsicc.—*Staudt* 642.
4. **U. Mannii** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A shrub, 15–20 ft. high, calyx green ; corolla white with 4 dark purple spots at the base inside.
Fernando Po ! Exsicc.—*Mann* 257.
5. **U. spectabilis** *A. Chev.* Bot. 7, name only. " Bunches of fruit on the trunk at ground level."
French Guinea : Fassakoidou (Feb.). Ivory Coast : Haute-Cavally (fr. April) ! Exsicc.—*Chev.* 21305.
6. **U. latifolia** *Engl. & Diels* l.c. 22, not of Blume. A liane, or tree up to 20 ft. high.
Sierra Leone : Falaba (Mar.) ! Kafogo, Limba (April) ! Also in Cameroons, 2,400 ft. alt. (fl. and fr. Mar.). Exsicc.—*Sc. Elliot* 5421 ; 5617.
7. **U. obanensis** *Bak. f.* in Cat. Talb. Nig. Pl. 1. *U. marginata* Diels. A climbing shrub with terete branches ; inner petals a dull orange colour, outer apricot, lined deep-red.
S. Nigeria : Oban ! Johann-Albrechtshöhe (Dec.). Exsicc.—*Talb.* 402 ; 432 ; 1579 ; 1603.
8. **U. tortilis** *A. Chev.* Bot. 8, name only.
Ivory Coast : Bingerville ! Exsicc.—*Chev.* 15563.
9. **U. nigrescens** *Engl. & Diels* l.c. 15. A climbing shrub.
Sierra Leone ! Exsicc.—*Afzelius.*
10. **U. Chamae** *P. Beauv.*—F.T.A. 1 : 22 ; Holl. 1 : 49. A shrub or small tree, young branchlets at first rusty-pubescent ; flowers brownish.
Throughout the area and also in Ubangi-Shari-Chad and Gabon.
Var. **macrocarpa** *Engl. & Diels* has larger fruits. (See Appendix).
11. **U. cristata** *R. Br.*—F.T.A. 1 : 23 ; Engl. & Diels l.c. 29. *U. echinata* A. Chev. Bot. 6, name only.
French Guinea : Futa Jallon. Sierra Leone ! Ivory Coast : Bériby (fr. Aug.) ! Exsicc.—*Chev.* 19997 ; 18818. *Purdie.*
12. **U. ovata** *A.DC.*—F.T.A. 1 : 21 ; Engl. & Diels l.c. 29. *U. microphylla* A. Chev. Bot. 7, name only. Climber with brownish flowers and yellow fruit.
Ivory Coast : Mt. Goula, 1,335 ft. (fr. April) ! Exsicc.—*Chev.* 21210.
13. **U. Farquharii** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A woody climber ; branchlets with spreading rusty pubescence.
S. Nigeria : Benin, Ukete (Sept.) ! Exsicc.—*Farquhar* 73 (partly).
14. **U. globosa** *Hook. f.*—F.T.A. 1 : 22 ; Engl. & Diels l.c. 14. *U. leonensis* Engl. & Diels. A shrub with rusty-pilose branches.
Sierra Leone : on rocks near the top of Sugar Loaf (April) ! Gold Coast : Accra (April, July) ! Cape Coast. Exsicc.—*T. Vogel* (no number). *Sc. Elliot* 5774. *Dalz.* 109.
Var. **Warneckei** *Engl.* is more hairy than the typical species.
Togo : Lome (fl. and fr. May) ! Exsicc.—*Warnecke* 147.
15. **U. cordata** *Schum. & Thonn.*—F.T.A. 1 : 22 ; Engl. & Diels l.c. 29. A much-branched shrub with rusty-tomentose branchlets.
" Upper Guinea," *Thonning.* S. Nigeria : Ukete (Sept.) ! Exsicc.—*Farquhar* 73 (partly).
16. **U. Caillei** *A. Chev.* Bot. 5, name only. Shrub up to 15 ft. high ; flowers yellow.
French Guinea : Mamou (Nov.) ! Exsicc.—*Chev.* 14817.
17. **U. Thomasii** *Sprague & Hutch.* in Kew Bull. 1916 : 158. A twining shrub with spreadingly hispid branches ; flowers solitary, supra-axillary.
Sierra Leone : Sendugu (June) ! Exsicc.—*Thomas* 569.
18. **U. Baumannii** *Engl. & Diels* l.c. 21. A climbing shrub or liane.
Togo : Misahöhe, in the forest (fr. April). Exsicc.—*Baumann* 527.
19. **U. Dinklagei** *Engl. & Diels* in Notizbl. Bot. Gart. Berl. 2 : 294 (1899)—Engl. & Diels Monogr. Afr. Anonac. 21. A climbing shrub, with yellowish-green flowers.
Liberia : Grand Bassa, in low bush near the seashore (May, Aug., fr. Sept.) ! Exsicc.—*Dinklage* 1717 ; 1794 ; 2061.
20. **U. sofa** *Scott Elliot* in Journ. Linn. Soc. 30 : 69—Chev. Bot. 7 ; Engl. & Diels l.c. 27. A tree, up to 20 ft. high.
French Guinea : several localities ! Sierra Leone : Farana, 3,600 ft. (Mar.) ! Exsicc.—*Sc. Elliot* 5376. (See Appendix).
21. **U. Doeringii** *Diels* in Engl. Bot. Jahrb. 53 : 435. A tree, up to 15 ft. or more high.
Togo : Atakpame (fr. May). Exsicc.—*Doering* 259.
22. **U. anonoides** *Bak. f.* l.c. 2. A climbing shrub.
S. Nigeria : Oban ! Exsicc.—*Talb.* 1558.
23. **U. Afzelii** *Scott Elliot* l.c. 70—Stapf 574 ; Engl. & Diels l.c. 22 ; Chev. Bot. 5. A shrub or tree, up to 15 ft. high, with heavily scented yellowish flowers.
French Guinea : between Dalaba and Mamou (Jan.). Sierra Leone : various localities (fl. April to June, fr. June to Dec.) ! Liberia : Sino Basin ! Ivory Coast : Several localities. Gold Coast : Axim (April) ! S. Nigeria : Oloke Meji (fr. June) ! Exsicc.—*Sc. Elliot* 4412 ; 5812. (See Appendix).
24. **U. scabrida** *Oliv.*—F.T.A. 1 : 21 ; Stapf 574. *U. microtricha* Engl. & Diels—Chev. Bot. 7. A climbing shrub or tree up to 30 ft. high ; petals yellowish-green.
Liberia : Grand Bassa (May). Ivory Coast : Guidéko (May, June) ! S. Nigeria : Calabar ! Eket ! Degema ! Cameroons River ! Also in French Cameroons, Gabon and Angola. Exsicc.—*Mann* 1433. *Thomson* 98. *Talb.* 3250 ; 3668. *Chev.* 16423 ; 19032 ; 19073.

Chevalier records *Uvaria Eminii* Engl. & Diels from Dahomey, but his specimen is not quite the same as that species, which is not known from our area. His material consists of a leafy shoot only and is insufficient for determination. He also records a specimen from Ivory Coast (No. 17998) as " *U.* cf. *U. chariensis* A. Chev.," but this differs from *U. chariensis* in its elongate-oblong, rather abruptly acuminate, very shortly cuneate leaves, with petiole nearly 1 cm. long ; there are no flowers or fruits.

2. CLEISTOPHOLIS Pierre—Engl. & Diels Monogr. Afr. Anonac. 33.

Leaves obtuse at the base, apex acute or somewhat acuminate, shortly petiolate, coriaceous, 20–50 cm. long, 5–6 cm. broad, main lateral nerves 20 to 30 on each side ; inflorescence many-flowered ; pedicels about 1 cm. long ; sepals triangular ; outer petals 2 to 3 times longer than the sepals or inner petals, ovate-oblong, 0·7 cm. long, 0·3 cm. broad .. .. 1. *Klaineana*

Leaves narrowing to the base or cuneate, apex distinctly acuminate, rarely 20 cm. long; main lateral nerves about 10 on each side; flowers up to 6 in fascicles:

Petioles 5 mm. long or less; leaves coriaceous, shining above, midrib noticeably depressed, 12–20 cm. long, 3–5 cm. broad; pedicels 2–2·5 cm. long; sepals small; outer petals obovate to oblong, 0·7–1 cm. long, 0·3–0·4 cm. broad, inner petals about 2 mm. long and broad; fruit-carpels on thickened stipes 1 cm. long, with or without constriction, oblique to the stipe, tuberculate, 2·5 cm. long, 1·5 cm. diam. 2. *patens*

Petioles at least 1 cm. long; leaves coriaceous, 10–15 cm. long, 5–6 cm. broad; pedicels 1 cm. long; sepals triangular, small; outer petals almost linear, 0·8 to 1 cm. long, 0·2 cm. broad .. .. 3. *Staudtii*

1. **Cleistopholis Klaineana** *Pierre* ex *Engl. & Diels* Monogr. Afr. Anonac. 35. A tree, up to 30 ft. high, with greenish flowers.
N. Nigeria: Lokoja (Mar.)! S. Nigeria: Lagos! Also in Gabon and Lower Congo. Exsicc.—*Dawodu* 146. *Shaw* 16. (See Appendix).
2. **C. patens** *Benth.*—F.T.A. 1: 34. A tree, up to 90 ft. high, with horizontal branches; flowers greenish-yellow; wood white, light, easily floats; bark grey or whitish, odoriferous when fresh.
General in the forest, from Sierra Leone (up to 3,500 ft.) to Gabon. (See Appendix).
3. **C. Staudtii** *Engl. & Diels* l.c. 35. A liane, up to 30 ft. long; flowers greenish-yellow.
S. Nigeria: Johann-Albrechtshöhe (April)! Also in French Cameroons. Exsicc.—*Staudt* 957. (See Appendix).

3. PACHYPODANTHIUM Engl. & Diels in Notizbl. Bot. Gart. Berl. 3: 55 (1900).

Leaves elongate-oblong, shortly tapered at each end, 15–25 cm. long, 4–5 cm. broad, sparingly clothed with minute stellate hairs below; branchlets closely tomentellous; sepals densely tomentellous outside, glabrous inside; petals glabrous; fruiting carpels loosely united, ribbed .. .. 1. *Staudtii*

Leaves broadly elliptic-lanceolate, narrowed from near the middle to each end, 17–22 cm. long, 5–6·5 cm. broad, sparingly clothed with minute stellate hairs below; branchlets at first minutely puberulous, at length glabrous; flowers not seen; fruiting carpels compact .. .. 2. *Barteri*

1. **P. Staudtii** *Engl. & Diels* Monogr. Afr. Anonac. 32, t. 11—Chev. Bot. 8. A large-boled forest tree, 60–90 ft. high, with grey, rough, odoriferous bark; timber hard; flowers pale yellow; mature fruit fleshy, reddish.
Sierra Leone: Kambui! Kennema (fl. and fr. Mar.)! Ivory Coast: various localities (Feb., Sept.–Nov.)! S. Nigeria: Oban! Also in Cameroons. Exsicc.—*Lane-Poole* 197. *Chev.* 16224. (See Appendix).
2. **P. Barteri** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *Anona Barteri* Benth.—F.T.A. 1: 17. Tree, 50 ft.; leaves shining; fruit the size of a peach.
S. Nigeria: Onitsha! Exsicc.—*Barter* 445.

4. ANONIDIUM Engl. & Diels in Notizbl. Bot. Gart. Berl. 3: 56 (1900).

Leaves at first puberulous, soon becoming glaucous, oblong-elliptic to obovate, narrowed or subcordate at the base, apex acuminate, 20–30 cm. long, 0·8–1·5 cm. broad, lateral nerves 12–16, united near the margin; inflorescence 30–40 cm. long; outer petals 4–4·5 cm. long, 2·5–3 cm. broad, inner smaller; fruit large, yellow, edible, somewhat resembling a pineapple, with very numerous crowded compressed carpels *Mannii*

A. Mannii *Engl. & Diels* Monogr. Afr. Anonac. 37. *Anona Mannii* Oliv.—F.T.A. 1: 17. Tree, 20–40 ft. high.
S. Nigeria: Calabar (Feb.)! Eket! Degema! Oban! Johann-Albrechtshöhe (Jan.)! Also in French Cameroons and N. Angola. Exsicc.—*Talb.* 3780; 3783. *Staudt* 813.

5. PIPTOSTIGMA Oliv.—F.T.A. 1: 18.

Leaves abruptly acuminate, more or less obovate or broadly elliptic:

Sepals linear-lanceolate, acuminate; inflorescence elongated, paniculate, silky-hirsute; leaves obovate-elliptic, rounded at the base, 20–30 cm. long, up to 15 cm. broad, with about 20 pairs of lateral nerves, weakly pilose below; inner petals longitudinally nerved, about 5·5 cm. long .. .. 1. *pilosum*

Sepals ovate-triangular, short, scarcely acuminate; inflorescence short and few-flowered:

Leaves oblong or obovate-elliptic, distinctly narrowed to the base, up to about 20 cm. long and 9 cm. broad, with 20–30 pairs of lateral nerves; inner petals linear-lanceolate, about 4·5 cm. long, rather obscurely nerved .. ..2. *Preussii*

Leaves broadly elliptic, rounded to the base, very large, up to 30–35 cm. long and 25 cm. broad, with about 30 pairs of lateral nerves; inner petals broadly lanceolate, about 5 cm. long, strongly nerved outside, softly tomentose; fruiting carpels stellate, sessile, bluntly beaked, ribbed, about 2·5 cm. long .. 3. *giganteum*

Leaves gradually acuminate, elongate-elliptic, about 20 cm. long and 6 cm. broad, slightly pubescent on the midrib and veins beneath, with about 20 pairs of lateral nerves; sepals linear, 1 cm. long, densely pubescent; inner petals lanceolate, 2·5 cm. long .. .. 4. *fugax*

1. **P. pilosum** *Oliv.*—F.T.A. 1: 18. *P. latipetalum* Bak. f. A tree.
S. Nigeria: Calabar! Eket! Oban! Exsicc.—*Thomson* 61. *Talb.* 1290; 1420; 1457; 3143.
2. **P. Preussii** *Engl. & Diels* Monogr. Afr. Anonac. 54. A tree, 30 ft.
S. Nigeria: Oban! Barombi (April)! Also in French Cameroons. Exsicc.—*Preuss* 251.

3. **Piptostigma giganteum** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A tree.
S. Nigeria : Oban ! Exsicc.—*Talb.* 1336.

4. **P. fugax** *A. Chev.* Bot. 13. A shrub up to 6 ft. ; flowers red.
Ivory Coast : Grabo, Cavally Basin (July) ! Forest between Middle-Sassandra and Middle Cavally (June). Exsicc.—*Chev.* 19620 ; 19193.

6. ALPHONSEOPSIS Bak. f. in Cat. Talb. Nig. Pl. 3, t. 1 (1913).

Leaves oblong to elliptic, glabrous above, glaucous beneath, apex acuminate, main lateral nerves 9 to 11, 18–23 cm. long, 4–7 cm. broad ; pedicels up to 0·6 cm. long ; bracteoles several ; petals yellow, the outer up to 0·9 cm. long, the inner slightly smaller .. .. *parviflora*

A. parviflora *Bak. f.* in Cat. Talb. Nig. Pl. 3, t. 1. A small tree, up to 15 ft. high.
S. Nigeria : Oban ! Exsicc.—*Talb.* 1607.

7. HEXALOBUS A.DC.—F.T.A. 1 : 26.

Petals about 8 cm. long, silky outside, lanceolate ; leaves acutely acuminate at the apex, obtuse or rounded at the base, 12–20 cm. long, 4–7 cm. broad, glabrous and shining above, shortly pubescent or glabrescent beneath ; pedicels 1 1·5 cm. long ; sepals ovate, thick, at length reflexed, about 1·5 cm. long, silky-tomentose ; fruiting carpels subsessile, ferrugineous-tomentose, oblong, 8 cm. long, 4 cm. broad, woody 1. *crispiflorus*

Petals under 3 cm. long ; leaves at most acute ; flowers subsessile :
Leaves more or less acute, distinctly pointed, pubescent below, oblong-lanceolate, rounded at the base, up to 14 cm. long and 4·5 cm. broad ; lateral nerves prominent below ; young branchlets softly tomentellous ; fruiting carpels turgid, 4–5 cm. long, 2 cm. thick .. .. 2. *monopetalus*
Leaves obtuse or rounded at the apex, glabrous below, narrowly oblong, rounded at the base, up to 15 cm. long and 4·5 cm. broad, with very faint lateral nerves below ; young branchlets glabrous or nearly so .. .. 3. *glabrescens*

1. **H. crispiflorus** *A. Rich.* in Sagra Fl. Cub. 1 : 43—Chev. Bot. 9. *H. grandiflorus* Benth.—F.T.A. 1 : 27. A tree, 60–80 ft., buttressed at the base, with conspicuous, pale-yellow, fragrant flowers ; fruit red, borne on the stem.
French Guinea : several localities (Mar.) ! Sierra Leone : several localities (Jan. to Mar.) ! Ivory Coast : Morenou (Nov.). N. Nigeria : Benue River. S. Nigeria : Lagos Colony ! Oban ! Calabar ! (fl. Mar., fr. Aug.). Ambas Bay ! Extends to Eastern Sudan, Gabon and Central Africa. Exsicc.—*Mann* 709. *Thomson* 41. *Lane-Poole* 167. *Talb.* 1245A.

2. **H. monopetalus** *Engl. & Diels* Monogr. Afr. Anonac. 56—Chev. Bot. 10. *H. senegalensis* A.DC.—F.T.A. 1 : 27 ; Holl. 1 : 50. *H. tomentosus* A. Chev. l.c., name only. *Uvaria monopetala* Guill. & Perr. Tent. Fl. Seneg. 8. t. 2. A small tree in open country, but large in fringing forests.
French Sudan : Dioubéla (Dec.) ; Keniéqué (Jan.) ; Macina (Sept.) ; Sansanding ! Senegal : Galam ! locality ? (May) ! Gambia ! Ivory Coast : Mankono (June). Dahomey : Atacora Mt. (June). N. Nigeria : Nupe ! Lokoja, Mt. Patti (Nov.) ! Yola (fl. Oct., fr. June) ! Extends to Eastern Sudan and Uganda. Exsicc.—*Barter* 938. *Perrottet* 8. *Chev.* 2542.

3. **H. glabrescens** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *H. monopetalus* var. *parvifolius* Bak. f. in Cat. Talb. Nig. Pl. 5. A shrub or a tree, up to 40 ft. ; flowers yellow ; fruit irregularly ovoid or cylindrical, orange-yellow, edible.
N. Nigeria : Yola (Oct.) ! (fr. June) ! Also in Chad-Shari Region. Exsicc.—*Shaw* 103. *Dalz.* 205. *Talb.* 531.

8. XYLOPIA Linn.—F.T.A. 1 : 29 ; Engl. & Diels Monogr. Afr. Anonac. 57.

Flower-buds ovoid or ovoid-globose ; outer petals more or less ovate, almost as broad as long :
Buds rounded at the apex ; calyx spreading, with ovate-triangular lobes about 5 mm. long ; pedicels about 1 cm. long ; leaves obovate-elliptic, subcuneate at the base, 9–16 cm. long, 4–7·5 cm. broad, strongly reticulate 1. *africana*
Buds subacute at the apex ; calyx small, very shallowly lobed, lobes about 2–3 mm. long ; pedicels about 3–4 mm. long ; leaves as above but smaller 2. *Staudtii*

Flower-buds lanceolate to linear, more or less pointed ; outer petals more or less linear :
Leaves more or less cuneate at the base :
Flowers clustered, often nodding or reflexed in bud ; leaves obovate, obtusely pointed, nearly glabrous, up to 13 cm. by 6 cm. ; carpels striate when mature, shortly stipitate, few-seeded .. .. 3. *Quintasii*
Flowers solitary, usually erect ; leaves oblong-elliptic to lanceolate :
Leaves acute, not acuminate, lanceolate, rather closely silky-pilose below, 5–9 cm. long, 2·5 –3·5 cm. broad, with about 10 pairs of slender lateral nerves ; flowers about 2·5 cm. long .. .. 4. *Elliotii*
Leaves distinctly acuminate, very thinly pilose or glabrescent below :
Young branchlets with long weak hairs ; leaves lanceolate or oblong lanceolate, obtusely acuminate, rounded or shortly cuneate at the base, about 10 cm. long and 3 cm. broad, hirsute on the midrib above ; fruits obscurely torulose, breaking up when ripe .. .. 5. *acutiflora*

Young branchlets at most very shortly pubescent ; leaves more or less elliptic :
Petiole very short, not more than 3 mm. long ; leaves with rather long appressed hairs below, often shining above and rather glaucous below 6. *aethiopica*
Petiole about 1 cm. long ; leaves very shortly puberulous below and often rust-coloured, finely reticulate ; lateral nerves faint, about 10 pairs 7. *rubescens*

Leaves rounded at the base :
Pedicels very short, with several imbricate bracts :
Flowers crowded, about 3 cm. long, silky ; young branchlets softly villous ; leaves oblong-lanceolate, acutely acuminate, 6–11 cm. long, 2–3·5 cm. broad, appressed-pilose below ; lateral nerves about 7 pairs .. .. .. 8. *villosa*
Flowers solitary ; young branchlets at most thinly pilose, becoming glabrescent ; other characters as above .. .. 5. *acutiflora*

Pedicels conspicuous, usually slender, about 1 cm. long :
Fruits short and thick ; leaves obtuse or slightly acuminate ; petals very slender towards the apex ; pedicels rather slender .. .. .. 9. *Vallotii*
Fruits rather long and slender, torulose ; leaves distinctly acuminate ; petals thick and gradually narrowed to the apex ; pedicels stout ; further characters as above 6. *aethiopica*

1. **Xylopia africana** *Oliv.*—F.T.A. 1 : 30; Engl. & Diels Monogr. Afr. Anonac. 59, partly. A tree, 30–40 ft., with rusty-silky buds.
Cameroons Mt., 4,000 ft. (Feb.) ! Also in the Island of St. Thomas. Exsicc.—*Mann* 1193. *Deistel* 151
2. **X. Staudtii** *Engl.* ex *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. Medium-sized tree with greyish flower-buds.
Sierra Leone : Kambui (Aug.) ! Gold Coast : Abosso ! S. Nigeria : Johann-Albrechtshöhe ! Also in French Cameroons, Gabon and Angola. Exsicc.— *Aylmer* 596. *Staudt* 530. *Vigne* 982.
3. **X. Quintasii** *Engl. & Diels* l.c. 62. *X. parviflora* A. Chev. Bot. 15, partly, not of Spruce or Pierre. *X striata* Engl. Bot. Jahrb. 34 : 160. *X. Lane-Poolei* Sprague & Hutch. A tree up to 90 ft.; flowers white.
Sierra Leone : Freetown (Mar., April) ! Kessewe (April) ! Ivory Coast : Bouroukrou (Dec., Jan.) ! Gold Coast : Adeambra (fl. and fr. May) ! Tanosu (fr. Sept.) ! S. Nigeria : Oban ! Akilla (April) ! Also in Cameroons and Island of St. Thomas. Exsicc.—*Lane-Poole* 123 ; 210. *Aylmer* 581. *Dalz.* 956. *Brent* 389. *Vigne* 856. *Talb.* 1302. *Chev.* 16118 ; 16638.
4. **X. Elliotii** *Engl. & Diels* l.c. 65. A shrub or tree, up to 30 ft., with sweet-scented flowers.
French Guinea : Niger bank ! Sierra Leone : Falaba (Mar.) ! Exsicc.—*Sc. Elliot* 5288 ; 5325.
5. **X. acutiflora** *A. Rich.*—F.T.A. 1 : 32. *X. oxypetala* Oliv. ex Engl. & Diels l.c. 63. *X. Thomsonii* Oliv.—F.T.A. 1 : 31. *X. Dinklagei* Engl. & Diels. A shrub or tall slender tree ; fruit scarlet.
Fairly common from Sierra Leone to Cameroons and Ubangi-Shari-Chad. Exsicc.—*Mann* 14. *Sc. Elliot* 4705. *Thomson* 63. *Talb.* 1353 ; 1486 ; 3267. *Dinklage* 1873. *Kersting* 67. *Staudt* 504. *Cook* 290.
6. **X. aethiopica** *A. Rich.*—F.T.A. 1 : 30 ; Stapf 575 ; Holl. 1 : 50. *X. Eminii* A. Chev. Bot. 15, not of Engl. A tree, up to 60 ft., with greenish-white flowers, and sometimes with adventitious roots.
From Senegal to Cameroons. Also in Gabon and Princes Island. (See Appendix).
7. **X. rubescens** *Oliv.*—F.T.A. 1 : 30. *X. Zenkeri* Engl & Diels. *X. humilis* Engl. & Diels. *X. parviflora* A. Chev., partly. A tree, up to 90 ft. ; leaves coriaceous, up to 6 in. long, 2–2½ in. broad ; fruit-carpels slender, stoutly stipitate, cylindric, slightly twisted, with shallow constrictions.
Liberia : Grand Bassa, in forest (fr. Aug.) ! Ivory Coast : Sanvi, Assinie (Apr.). S Nigeria : Calabar ! Also in Cameroons. Exsicc.—*Dinklage* 2006. *Chev.* 16321 ; 18149. *Thomson* 53.
8. **X. villosa** *Chipp* in Kew Bull. 1923 : 183. *X. macrocarpa* A. Chev. Bot. 15, name only. A large forest tree.
Ivory Coast (fr. Dec.) ! S. Nigeria : Ibadan (Nov.) ! Lagos (Oct.) ! Degema ! Eket ! Oban ! Exsicc.—*Talb.* 3775 ; 3209 ; 1601. *Foster* 354. *Punch* 119. *Talb.* 3775. *Chev.* 22516. (See Appendix).
9. **X. Vallotii** *Hutch. & J. M. Dalz* in Kew Bull. 1927, ined. *X. parviflora* Engl. & Diels, not of Spruce or Pierre—Chev. Bot. 15, partly. A shrub or tree, up to 50 ft.
Widely distributed from Sierra Leone to Cameroons. Also in the Congo Basin.

9. UVARIASTRUM Engl. in Engl. & Diels Monogr. Afr. Anonac. 31, t. 10—Sprague & Hutch. in Kew Bull. 1916 : 159.

Leaves glabrous, 10–15 cm. long, 3–4 cm. broad ; nerves 10–12 on each side, the veins prominent beneath ; flowers on the one-year-old branches ; sepals glabrous outside, distinctly gibbous, margins later reflexed ; outer petals 1·5–2·5 cm. long 1. *Zenkeri* var. *nigritanum*

Leaves pilose at least when young ; sepals externally velutinous or tomentose ; calyx not more than 1·5 cm. long :
Nerves of the leaves markedly sunken above, 10–12 on each side ; leaves hairy on midrib above, pilose beneath, 10–15 cm. long, 4–4·5 cm. broad ; flowers solitary, generally in the axils on the older twigs ; outer petals about 2·5 cm. long 2. *insculptum*

Nerves of the leaves slightly raised above, 6–8 on each side ; young twigs and leaves densely yellow-sericeous, becoming glabrous ; leaves 8–16 cm. long, 3–6 cm. broad ; cymes terminal on lateral branchlets ; petals about 1·3 cm. long 3. *Elliotianum*

1. **U. Zenkeri** *Engl. & Diels* var. **nigritanum** *Bak. f.* in Cat. Talb. Nig. Pl. 3. A tree, about 45 ft.
S. Nigeria : Oban ! Exsicc.—*Talb.* 3 ; 1341 ; 1534. The typical species is in Cameroons.
2. **U. insculptum** *Sprague & Hutch.* in Kew Bull. 1916 : 159. *Uvaria insculpta* Engl. & Diels. A shrub or tree, up to 15 ft., in the forest.
S. Nigeria : Atigere (Feb.) ! Johann-Albrechtshöhe (Mar.) ! Also in French Cameroons. Exsicc.—*Staudt* 740. *Millen* 151.
3. **U. Elliotianum** *Sprague & Hutch.* l.c. *Uvaria Elliotiana* Engl. & Diels—Chev.Bot. 6. A small tree.
Sierra Leone : Talla Hills (Feb.) ! Bandajuma (May) ! Ivory Coast : several localities. N. Nigeria : Abinsi (June) ! S. Nigeria : Lagos Colony (Aug., Feb.) ! Exsicc.—*Sc. Elliot* 4855. *Rowland. Aylmer* 79. *Dalz.* 761. *Foster* 9.

10. ARTABOTRYS R. Br.—F.T.A. 1 : 27.

Leaves large, 15–25 cm. long, 10–15 cm. broad, broadly elliptic or ovate-rotundate, rounded at the base, rather abruptly and acutely acuminate, with 6–8 pairs of arcuate nerves prominent below ; petals about twice as long as the sepals 1. *macrophyllus*

Leaves usually much smaller, ovate to obovate-elliptic or oblong :

Leafy branchlets glabrous or nearly so :

Leaves more or less ovate and narrowed from the middle upwards, with the lateral nerves prominent on the upper surface :

Leaves rounded at the base, rather closely reticulate, 15–21 cm. long, 7–9 cm. broad ; petals about 2·5 cm. long, puberulous on both sides ; carpels numerous, glabrous in fruit .. .. 2. *Jollyanus*

Leaves shortly cuneate at the base, laxly reticulate, 9–12 cm. long, 4–5 cm. broad ; petals about 1 cm. long, velvety-tomentose, subterete .. 3. *nigericus*

Leaves oblong- to slightly obovate-elliptic, mostly rather abruptly acuminate :

Petals broadly lanceolate, not contracted at the base, about 1·5 cm. long and 8 mm. broad, very sparsely and shortly pubescent outside ; peduncles about 1-flowered ; leaves about 15 cm. long and 5 cm. broad, with 8–10 pairs of lateral much-looped nerves .. .. 4. *oliganthus*

Petals abruptly constricted above the broadened base :

Inflorescence many-flowered :

Leaves acute at the base, long-acuminate at the apex, 6–10 cm. long, 2–3 cm. broad ; inflorescence slender .. .. 5. *libericus*

Leaves rounded at the base, shortly acuminate at the apex, 10–15 cm. long and about 6 cm. broad ; inflorescence densely many-flowered 6. *Thomsonii*

Inflorescence very few-flowered ; petals silky tomentose outside the broadened base, about 2 cm. long ; leaves oblong, shortly acute at the base, gradually acuminate, 7–10 cm. long, 3–3·5 cm. broad, very slightly pubescent below 7. *insignis*

Leafy branchlets very hispid with rust-coloured hairs :

Petals linear-subulate from a broadened thickened base, 1·5 cm. long, acute, subterete ; inflorescence few-flowered ; leaves oblong-lanceolate, rounded at the base, obtusely acuminate, 5–9 cm. long, pilose on the midrib beneath 8. *hispidus*

Petals linear, obtuse, about 1 cm. long, slightly flattened :

Petals with a broad ovate-triangular base ; leaves more or less cuneate at the base, hardly or very shortly acuminate at the apex, 7–9 cm. long, 3–4 cm. broad, pubescent mainly on the midrib below ; inflorescence very short and few-flowered 9. *velutinus*

Petals very slightly broadened at the base ; leaves rounded at the base :

Leaves oblong, acutely and rather abruptly acuminate, 8–13 cm. long, 3–5·5 cm. broad, pubescent on the midrib beneath ; flowers rather numerous 10. *stenopetalus*

Leaves elliptic, very obtusely and shortly acuminate, 4–8 cm. long, 2·5–4 cm. broad, pubescent on the midrib beneath ; flowers few 11. *dahomensis*

1. **A. macrophyllus** *Hook. f.*—F.T.A. 1 : 28. A small glabrous tree.
Fernando Po ! Exsicc.—*T. Vogel* 137.

2. **A. Jollyanus** *Pierre* ex *Engl. & Diels* Monogr. Afr. Anonac. 73.
Ivory Coast : Dobau (Nov.). Also in Cameroons. Exsicc.—*Jolly* 157 (not seen).

3. **A. nigericus** *Hutch.* in Kew Bull. 1921 : 356. A shrub, up to 20 ft. high, with twining branches; flowers yellow, scented.
N. Nigeria : Naraguta, river banks (Aug.) ! Exsicc.—*Lely* 541.

4. **A. oliganthus** *Engl. & Diels* l.c.—Stapf 575. *A. rubicunda* A. Chev. Bot. 9, name only. A climbing shrub ; fruit red when ripe.
Liberia : Grand Bassa, in wet patches of forest near seashore (Oct.) ! Ivory Coast : Basin of the Haut-Nuon (fr. April) ! Exsicc.—*Dinklage* 2083. *Chev.* 21297. *Cook* 102 ; 183.

5. **A. libericus** *Diels* in Engl. Bot. Jahrb. 53 : 446. A shrub, with weak trailing branches ; flowers greenish-yellow.
Liberia : in forest (April) ! Exsicc.—*Dinklage* 2567. *Cook* 301 ; 342.

6. **A. Thomsonii** *Oliv.*—F.T.A. 1 : 28. A yellow-flowered tree, up to 45 ft. high.
S. Nigeria : Calabar (Feb.) ! Also in Cameroons, Gabon and Upper Congo. Exsicc.—*Thomson* 25 ; 2310.

7. **A. insignis** *Engl. & Diels* in Engl. Bot. Jahrb. 39 : 483. *A. lucidus* A. Chev. Bot. 9.
Ivory Coast : Morénou (fr. Dec.) ! Bokasso to Promprom (Mar.) ; Zaranou (Mar.). Also in Cameroons. Exsicc.—*Chev.* 22495.

8. **A. hispidus** *Sprague & Hutch.* in Kew Bull. 1916 : 149.
Sierra Leone : Roruks, at 200 ft. (Nov.) ! Exsicc.—*Thomas* 5770.

9. **A. velutinus** *Scott Elliot* in Journ. Linn. Soc. 30 : 71 (1894). *A. djalonis* A. Chev. Bot. 8, name only. A climbing shrub or liane, with yellowish-green or pale-yellow flowers.
French Guinea : Between Kouria and Irébéléya (fr. Sept.) ! Timbo (Mar.) ; Diaguissa (April) ; Dalaba (Mar.) ; Fassakoidou (Feb.). Sierra Leone : Falaba, riverside climber (Mar.) ! Ivory Coast : Sanvi (Mar.) ; Middle Sassandra (June) ; Morénou (Dec.). Exsicc.—*Sc. Elliot* 5137. *Chev.* 18265. (See Appendix).

10. **A. stenopetalus** *Engl. & Diels* in Notizbl. Bot. Gart. Berl. 2 : 300.
S. Nigeria : ? locality ! Also in French Cameroons. Exsicc.—*Foster* 316.

11. **A. dahomensis** *Engl. & Diels* l.c. 299—Chev Bot. 8.
Dahomey : Allada, in fringing forest (Feb., Mar.) ; Ouidah (April) ! Exsicc.—*Thomas* 1399. *Chev.* 23434.

11. POLYALTHIA Blume—F.T.A. 1 : 26.

Leaves very thin, ovate-elliptic to ovate-oblong, broadest about the middle, apex tapering into acumen, when dry the same colour above and beneath, 10–20 cm. long, 4·5–7·5 cm. broad; sepals densely pubescent. Petals 5 to 6 times longer than the calyx, ribbed, densely pubescent but glabrous on inside of lower parts, 1–1·2 cm. long .. .. *Oliveri*

P. Oliveri *Engl.*—Engl. & Diels Monogr. Afr. Anonac. 42; Stapf 574; Chev. Bot. 10. *P. acuminata* Oliv.—F.T.A. 1 : 26, not of Thwaites. A white-flowered shrub or small tree growing in the forest.
Sierra Leone: Bagroo River (April)! Bandajuma (May)! Gola Forest (fr. Jan.)! Powana (fr. Dec.). Liberia: Sino Basin! Grand Bassa (April). Ivory Coast: several localities (Feb., Mar., July). S. Nigeria: Calabar! Also in Cameroons, St. Thomas Isl. and Tanganyika. Exsicc.—*Mann* 841. *Thomson* 109. (See Appendix).

12. POPOWIA Endl.—Engl. & Diels Monogr. Afr. Anonac. 43.

Flowers in the axils of the leaves on the current season's growth:
Sepals lanceolate, half as long as the petals or more, about 0·5 cm. long; leaves narrowed to an obtuse base, acutely and rather broadly acuminate, 5–13 cm. long, 2–4 cm. broad, glaucous and minutely pubescent below; flowers solitary, pendulous; pedicels 1·5 cm. long, puberulous .. .. 1. *stenosepala*
Sepals very short, more or less triangular, not more than 2 mm. long; leaves usually rounded at the base:
Flowers in very short racemes; pedicels scarcely 0·5 cm. long, subtomentose; petals 3·5 mm. long, tomentellous; leaves oblong-elliptic, markedly glaucous below, 6–10 cm. long and up to 4·5 cm. broad .. .. .. 2. *Mannii*
Flowers single or paired:
Pedicels bracteate only at the base, up to 1 cm. long, shortly pubescent; leaves oblong-elliptic, broadly acuminate, 10–15 cm. long, 3·5–5·5 cm. broad, glabrous, glaucous and finely reticulate below; lateral nerves 6–7 pairs 3. *Dalzielii*
Pedicels bracteate near the middle:
Leaves punctate below, pubescent only on the nerves, 7–12 cm. long, 3–5 cm. broad, subcordate at the base; fruits more or less torulose, long-stipitate 4. *Heudelotii*
Leaves minutely puberulous below, rounded at the base, 8–12 cm. long, 3–4·5 cm. broad .. .. 5. *nigritana*
Leaves finely pubescent below, slightly cuneate at the base, about 8 cm. long, finely reticulate; fruiting carpels rather fleshy, about 1 cm. long, with a thick tomentose stipe .. .. 6. *Barteri*
Flowers few in small clusters on the leafless branchlets of the previous season's growth:
Leaves shortly acuminate, oblong, rounded and subcordate at the base, 8–12 cm. long, 3·5–5 cm. broad, glaucous and purplish below; pedicels up to 2 cm. long, glabrescent; fruiting carpels shortly stipitate, oblong, apiculate, 1 cm. long, puberulous .. .. 7. *Vogelii*
Leaves obtuse, not acuminate, subelliptic, rounded at the base, 10–16 cm. long, 4·5–6·5 cm. broad, greyish below; pedicels less than 1 cm. long, tomentellous; fruits not seen .. .. 8. *Whytei*
Flowers in dense clusters on leafless branches of several seasons' growth; pedicels elongated; sepals small and triangular; petals broadly ovate, concave, about 0·5 cm. long; leaves obovate-oblong, broadly acuminate, 10–15 cm. long, about 5 cm. broad, with about 12 pairs of prominent lateral nerves and numerous conspicuous tertiary nerves, very minutely pubescent below; fruiting carpels stipitate, torulose, tomentellous .. .. 9. *cauliflora*

1. **P. stenosepala** *Engl. & Diels* Monogr. Afr. Anonac. 49—Chev. Bot. 11. A shrub, 2–3 ft., with yellow flowers.
Sierra Leone: Madina, Limba (April)! Port Lokko (April)! Ivory Coast: Danané (April); Bâlé (May). Exsicc.—*Sc. Elliot* 5564; 5882
2. **P. Mannii** *Baill.* *P. Baillonii* Engl. & Diels l.c. 48. A scrambling shrub with silvery leaves and very small flowers.
Sierra Leone: Bagroo R.! Karene (Dec.)! Berria (Mar.)! Exsicc.—*Mann* 809. *Sc. Elliot* 4020; 5415.
3. **P. Dalzielii** *Hutch.* in Kew Bull. 1927, ined. A scrambling shrub, like the preceding climbing by tendril-like bases of the lateral branches; flowers very small.
N. Nigeria: Abinsi (July)! S. Nigeria: Oloke Meji! Also in Cameroons. Exsicc.—*Dalz.* 712. *Foster* 312.
4. **P. Heudelotii** *Baill.*—Engl. & Diels l.c. 51; Chev. Bot. 11. A scandent shrub, up to 6 ft.; fruits yellow and red.
Ivory Coast: Guidéko (June). S. Nigeria: Onitsha (fr. May)! Degema! Exsicc.—*Barter* 1335. *Unwin* 49. *Talb.* 3727. (See Appendix).
5. **P. nigritana** *Bak. f.* in Cat. Talb. Nig. Pl. 4. A climbing shrub; sepals pale bronze; petals creamy yellow.
S. Nigeria: Oban! Exsicc.—*Talb.* 1550.
6. **P. Barteri** *Baill.*—Engl. & Diels l.c. 51; Chev. Bot. 11. A shrub or small tree; berries red.
French Guinea: ? loc.! Sierra Leone: Limba (April)! Kambia (fr. Jan.)! Ivory Coast: Guidéko (June). N. Nigeria: Nupe! Exsicc.—*Barter* 1221. *Sc. Elliot* 4671; 5656.
7. **P. Vogelii** *Baill.*—Engl. & Diels l.c. 50. A small riverside tree with twining branches.
N. Nigeria: Lokoja (fr. Sept.)! S. Nigeria: Oban! Exsicc.—*T. Vogel* 203.

8. **Popowia Whytei** *Stapf* 575. *P. prehensilis* A. Chev. Bot. 11, name only. A shrub, erect or climbing; flowers yellowish; fruit yellow.
Liberia: Sinoe Basin! Ivory Coast: Bingerville (young fr. Dec.)! Between Guébo and Mbago (fr. Feb.)! Between Byanouan and Soubiré (Mar.). Exsicc.—*Chev.* 16048; 17077.
9. **P. cauliflora** *Chipp* in Kew Bull. 1923: 182. *Clathrospermum Mannii* Oliv., in part (see Chipp l.c.). A lofty-climbing shrub, densely rusty-pubescent on the young branchlets.
S. Nigeria: Calabar! Oban! Also in Cameroons and Gabon. Exsicc.—*Talb.* 1612.

13. STENANTHERA Engl. & Diels Monogr. Afr. Anonac. 67.

Leaves not narrowed to the rounded or subcordate base, about 20 cm. long and 7 cm. broad, with about 15 pairs of lateral nerves; branchlets becoming glabrous; pedicels slightly thickened towards the top; outer petals not more than 2 cm. long 1. *myristicifolia*
Leaves cuneate or narrowed at the base:
Outer petals up to 7 cm. long; branchlets remaining rusty-pubescent; leaves up to 14 cm. long and 5 cm. broad, shortly narrowed to the base, with about 8 pairs of lateral nerves; pedicels considerably thickened towards the top .. 2. *hamata*
Outer petals about 1·5 cm. long; branchlets pubescent; leaves up to 15 cm. long, obovate-cuneate, narrowed from above the middle to the base, with about 12 pairs of lateral nerves; pedicels gradually thickened towards the top, 3·5 cm. long; fruits ribbed .. .. 3. *bakuana*

1. **S. myristicifolia** *Engl. & Diels* Monogr. Afr. Anonac. 67. *Oxymitra myristicifolia* Oliv.—F.T.A. 1 33 A shrub or tree; corolla bright yellow.
S. Nigeria: Calabar! Exsicc.—*Thomson* 134.
2. **S. hamata** *Engl. & Diels* l.c. 68—Chev. Bot. 16. *Oxymitra hamata* Benth.—F.T.A. 1: 33. A small tree.
Sierra Leone: Bagroo River (April)! Sherboro! Ivory Coast: Sanvi, Aboisso (April)! Exsicc.—*Mann* 876. *Sc. Elliot* 5861. (See Appendix).
3. **S. bakuana** *A. Chev.* Bot. 15, name only. A shrub, up to 5 ft.; flowers yellowish; fruit yellow.
Ivory Coast: various localities! Exsicc.—*Chev.* 15429.

14. OXYMITRA Hook. f. & Thoms.—Sprague & Hutch. in Kew Bull. 1916: 153.

Pedicels slender, about 2 cm. long or more; branchlets more or less glabrous:
Leaves shortly acuminate, acumen not much more than 1 cm. long:
Flowers in fascicles of about 3; pedicels about 3 cm. long; leaves subacute at the base, oblong, 7–15 cm. long, 3–5 cm. broad, pale glaucous-green below, glabrous; petals minutely pubescent, the outer 7–8 mm. long, triangular; fruit ribbed, about 2 cm. long, glabrous .. .. 1. *longipedicellata*
Flowers solitary; pedicels about 2 cm. long:
Leaves obovate, rounded or obtuse at the base, 7–11 cm. long, 2·5–3·5 cm. broad, slightly hairy and more or less glaucous below; outer petals ovate, 1·2 cm. long, minutely pubescent; inner petals connivent, about half as long as the outer; fruiting carpels stipitate, 1–4-seeded, moniliform .. .. 2. *gracilis*
Leaves elliptic, rounded at the base, 6–12 cm. long, 3–5 cm. broad, glabrous and glaucous below; flowers small (seen only in the young stage) 3. *gracilipes*
Leaves acutely long-acuminate, acumen about 2 cm. long; blade obovate-oblong, 7–14 cm. long, 2·5–4·5 cm. broad, more or less glaucous and minutely pubescent below; outer petals lanceolate, 2 cm. long, puberulous, the inner connivent, less than half as long as the outer .. .. 4. *rosea*
Pedicels short and stoutish, about 1 cm. long or less; branchlets more or less hirsute:
Leaves glabrous, very glaucous below, oblong or oblong-elliptic, acutely long-acuminate, slightly cordate at the base, 12–25 cm. long, 4–7 cm. broad, with numerous slender tertiary nerves; inner petals glabrous; fruiting carpels shortly stipitate, 1–2·5 cm. long, tomentellous .. .. 5. *glaucifolia*
Leaves pubescent or pilose on the nerves and veins below:
Leaves narrowed towards the base, oblong or oblong-oblanceolate, up to 6·5 cm. broad:
Branchlets shortly and densely tomentose; leaves oblong-elliptic to oblong-oblanceolate, shortly and obtusely acuminate, subcordate at the base, 9–18 cm. long; outer petals ovate-lanceolate, 1–1·3 cm. long, 5–6 mm. broad, tomentellous outside; inner petals about half as long.. .. .. .. 6. *velutina*
Branchlets loosely bristly pilose; leaves subsessile, 10–14 cm. long, slightly glaucous and laxly pilose on the nerves below; sepals broadly ovate, about 0·5 cm. long; outer petals ovate, 1·5 cm. long, nervose; inner petals glabrous 7. *obanensis*
Leaves broadly elliptic, rounded to a shortly cordate base, up to 16 cm. long, about 8 cm. broad, often widely emarginate at the apex, pilose on the nerves below; outer petals ovate, acute, 1·7 cm. long, silky and strongly nerved; fruiting carpels oblong, stipitate, 3·5 cm. long, hirsute .. .. 8. *hirsuta*

1. **O. longipedicellata** *Sprague & Hutch.* in Kew Bull. 1916: 154. *Cleistopholis albida* Engl. & Diels var. *longipedicellata* Bak. f. in Cat. Talb. Nig. Pl. 3. A climbing shrub; petals yellowish, mauve inside at the base.
S. Nigeria: Oban! Exsicc.—*Talb.* 1559; 1677.
2. **O. gracilis** *Sprague & Hutch.* l.c. 154. *O. platypetala* Benth.—F.T.A. 1: 33. *Cleistopholis platypetala* Engl. & Diels. *Unona Millenii* Engl. & Diels—Chev. Bot. 10. A small tree, with pendulous greenish flowers.
Sierra Leone: Bagroo River (April)! Kambia (Jan.)! Ivory Coast: Bingerville! Lagos (April)! Epe (fr. Dec.)! Exsicc.—*Mann* 857. *Sc. Elliot* 4382; 4705. *Millen* 149. *Chev.* 15483.

8. **Oxymitra gracilipes** *Benth.*—F.T.A. 1 : 33. A shrub, up to 25 ft. high, with greenish-white petals.
Fernando Po, on the beach ! Exsicc.—*Mann* 251.
4. **O. rosea** *Sprague & Hutch.* l.c. 154. A shrub, with flexuous grey branches covered with lenticels ; flowers pendulous, bright pink.
S. Nigeria : Oban ! Exsicc.—*Talb.* 199.
5. **O. glaucifolia** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A shrub.
S. Nigeria : Oban ! Exsicc.—*Talb.* 403 ; 1255.
6. **O. velutina** *Sprague & Hutch.* l.c. 156. A shrub with flexuous rusty branches.
Sierra Leone : Yonibana (fr. Nov.) ! Makump (fr. July) ! Exsicc.—*Thomas* 968 ; 4701 ; 5005.
7. **O. obanensis** *Sprague & Hutch.* l.c. 156. *Unona obanensis* Bak. f. A tall tree ; inflorescence with a broad hairy bract at the base of the peduncle ; outer petals apricot-red, inner dull-orange.
S. Nigeria : Oban ! Exsicc.—*Talb.* 1246 ; 1323.
8. **O. hirsuta** *Sprague & Hutch.* l.c. 155. *Unona hirsuta* Benth.—Chev. Bot. 10. A shrub, 20 ft. high.
Sierra Leone : Talla Hills (fr. Feb.) ! Ivory Coast : Bingerville ; Guidéko (May). Fernando Po (Nov.) ! Exsicc.—*Mann* 559. *Sc. Elliot* 4854. *Chev.* 15428 ; 16408.

15. TETRASTEMMA Diels in Engl. Bot. Jahrb. 38 : 241 (1906).

Leaves elongate-oblong or oblanceolate, rounded and slightly subcordate at the base, rather long-acuminate, 15–27 cm. long, 4–7 cm. broad, glabrous except the midrib below, laxly reticulate ; flowers single on the old wood from a very short pustular branchlet, pink outside, carmine inside ; pedicels about 0·5 cm. long ; sepals 2, very small ; petals linear-lanceolate, acute, thick, strigose-pubescent outside, 1·5–2 cm. long .. .. *Bakerianum*

T. Bakerianum *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A shrub or tree.
S. Nigeria : Oban ! Mbarakpa-Obutong Road (Dec.) ! Exsicc.—*Talb.* 1517.

16. DENNETTIA Bak. f. in Cat. Talb. Nig. Pl. 5, t. 2 (1913).

Medium-sized tree ; branchlets glabrous ; leaves oblong or oblong-elliptic, very shortly cuneate at the base, obtusely acuminate, 10–15 cm. long, 4–6 cm. broad, laxly reticulate ; lateral nerves about 10 pairs, much branched towards the margin ; flowers few on short pustular branchlets ; pedicels about 1 cm. long, tomentellous ; sepals very broad, 3 mm. long, appressed-pubescent ; petals ovate, 1 cm. long, shortly pubescent .. .. *tripetala*

D. tripetala *Bak. f.* in Cat. Talb. Nig. Pl. 5, t. 2 (1913).
S. Nigeria : Benin City (Jan.) ! Exsicc.—*Dennett* 99.

17. ENANTIA Oliv.—F.T.A. 1 : 17.

Petals externally covered with appressed minute hairs ; stalk of fruit-carpel much longer than pedicel ; leaves obovate to oblanceolate, base cuneate, apex acute, glabrous except on midrib, 12–25 cm. long, 5–9 cm. broad, main lateral nerves about 10 ; flowers solitary ; pedicels 1·5–2 cm. long ; petals obtuse .. 1. *chlorantha*

Petals externally tomentose ; stalk of fruit-carpel about as long as or only slightly longer than pedicel ; leaves ovate to elliptic-oblong, base narrowed, apex shortly acuminate, 15–25 cm. long, 4–8 cm. broad ; main lateral nerves 8–10 ; flowers 1–2 on thickened pedicels 2·2·5 cm. long ; petals thick, triquetrous, 2·5 cm. long ; fruit-carpels 30 or more, glabrous ; stipes 2·5–4 cm. long .. .. 2. *polycarpa*

1. **E. chlorantha** *Oliv.*—F.T.A. 1 : 18 ; Chev. Bot. 13. A tree, 20–60 ft. high, with yellow wood ; carpels black when ripe, not edible.
Ivory Coast : Bouroukrou (fr. Jan.) ! Bingerville. S. Nigeria : Calabar ! Benin (July) ! Also in Cameroons and Gabon. Exsicc.—*Thomson* 130. (See Appendix).
2. **E. polycarpa** *Engl. & Diels* Monogr. Afr. Anonac. 69—Holl. 1 : 51. *Xylopia polycarpa* Oliv.—F.T.A. 1 : 32. A tree, like the preceding.
Sierra Leone : Sugar Loaf Mt., 1,800–2,000 ft. ! Exsicc.— *Afzelius*. *Daniell*. (See Appendix).

18. ANONA Linn.—F.T.A. 1 : 14.

Leaves distinctly petiolate :

Leaves rounded at the apex, broadly or rounded-elliptic, pubescent below or rarely glabrescent, closely reticulate ; branchlets usually tomentellous ; flowers usually softly pubescent .. .. 1. *senegalensis*

Leaves triangular-acute at the apex, oblong-elliptic, glabrous, reticulate ; branchlets glabrous ; flowers glabrous or nearly so .. .. 2. *palustris*

Leaves nearly sessile, oblong-elliptic, acute at the base, glabrous, glaucous below, 8–12 cm. long ; pedicels 4 cm. long, glabrous .. .. 3. *glauca*

Several species introduced from the West Indies are cultivated for their fruit and may be naturalised in places, e.g. *A. muricata* Linn., the sour-sop, *A. reticulata* Linn., the custard-apple, *A. squamosa* Linn., the sweet-sop.

1. **A. senegalensis** *Pers.*—F.T.A. 1 : 16 ; Engl. & Diels Monogr. Afr. Anonac. 78 ; Holl. 1 : 48. A shrub sometimes attaining the size of a small tree. Fruit edible, smooth, yellow when ripe, showing the outline of the carpels by coloured reticulation on the surface.
Common in the more open lands throughout tropical Africa and extending to the Transvaal. (See Appendix).
2. **A. palustris** *Linn.*—F.T.A. 1 : 16 ; Engl. & Diels l.c. 78 ; Holl. 1 : 48 ; Chev. Bot. 14. A small tree of coastal marshes ; fruit smooth, yellowish when ripe ; leaves more or less shining above. A native of Tropical America.
Senegal : near Cape Verde ; Cayor, M'Boro. Gambia : Albreda ! Liberia : Grand Bassa (July) ! Ivor Coast : mouth of Cavally R. (Aug.). S. Nigeria : Lagos (Feb.–Apr.) ! Also in Cameroons. Exsicc.—*T. Vogel* 100. *Perrottet* 5. *Dalz.* 1097.

3. **Anona glauca** *Schum. & Thonn.*—F.T.A. 1 : 17; Engl. & Diels l.c. 80; Chev. Bot. 13. A shrub, 2–4 ft. French Sudan: Sansanding (Sept.). Senegal: ? locality. Sierra Leone: ? locality. Gold Coast: Cape Coast! Wenchi! Kete Kratchi! Also in Shari-Chad. Exsicc.—*Brass* 1790. *Gruf Zech* 304. *Afzelius*.

19. ISOLONA Engl.—Engl. & Diels Monogr. Afr. Anonac. 82.

Corolla-tube short, not expanded at the base:

Branchlets slender, blackish when dry, glabrous; leaves oblong or oblong-lanceolate, obtusely long-acuminate, narrowly cuneate at the base, 8–15 cm. long, 2–5 cm. broad, slightly shining on both surfaces; lateral nerves 8–10, looped; flowers few, axillary, solitary towards the base of the branchlets; pedicels 1–1·5 cm. long; corolla glabrous, lobes acute; fruit ovoid, 4–5 cm. long, 2–3 cm. in diameter, black when dry, lobulate .. .. 1. *leonensis*

As above, but corolla-lobes rounded-obtuse at the apex .. .. 2. *soubreana*

Corolla-tube as long as or longer than the lobes, dilated at the base; branchlets blackish, verrucose, glabrous; leaves more or less as in *I. leonensis*, but not so acuminate and more broadly cuneate at the base .. .. 3. *campanulata*

FIG. 11.—ISOLONA LEONENSIS *Sprague & Hutch.* (ANONACEAE).

A, corolla laid open.

B, calyx, stamens and pistil.

C, stamen.

D, ovary in cross-section.

E, fruit.

1. **I. leonensis** *Sprague & Hutch.* in Kew Bull. 1916 : 151. A shrub or small tree.
Sierra Leone: Common in the forest (fl. Oct., Nov., June; fr. Oct., Nov.)! Exsicc.—*Thomas* 4230; 4690.

2. **I. soubreana** *A. Chev.* Bot. 12. A shrub or medium-sized tree; flowers greenish; corolla green-purple within; fruit yellow.
Liberia: ? locality! Ivory Coast: Soubré (June)! Exsicc.—*Chev.* 19088; 19138. *Cook* 86; 87.

3. **I. campanulata** *Engl. & Diels* Monogr. Afr. Anonac. 83. A tree; "sepals bright green; petals blackish-purple."
S. Nigeria: **Eket! Also in Cameroons. Exsicc.**—*Talb.* 3261.

20. MONODORA Dunal—F.T.A. 1 : 37.

Inner petals as long as or longer than the outer crispate petals, shortly clawed, broadly obovate, about 2·5 cm. long, pilose-setose near the middle of the margin; leaves oblong-oblanceolate, rounded at the base, obtuse at the apex, 6–12 cm. long, 3–4·5 cm. broad, somewhat glaucous below; lateral nerves about 15 pairs; pedicels about 5 cm. long .. .. 1. *Unwinii*

Inner petals much shorter than the outer crispate ones:

Inner petals very narrow, with a pair of lateral hairy appendages about the middle; leaves obovate-oblong, 15–20 cm. long, 4–5·5 cm. broad; flowers borne on the previous season's growth; sepals ovate-lanceolate, up to 5 cm. long and 3 cm. broad; fruit ovoid, not ribbed, about 10 cm. long and 8·5 cm. broad 2. *tenuifolia*

Inner petals very broad and obovate or clawed and spathulate, not appendaged, or the appendages near the base:

Inner petals with a long claw almost as long as the limb, spathulate; pedicels very slender, 3 cm. long, with a lanceolate acute bract about the middle; sepals lanceolate, crispate on the margin; leaves obovate to oblong, acuminate, rounded at the base, 6–8 cm. long, 2·5–4 cm. broad .. .. 3. *crispata*

Inner petals very shortly clawed or sessile, broadly ovate :

Bracts and sepals with wavy crispate margins ; leaves elliptic to obovate-elliptic, rounded at the base, acuminate, 15–45 cm. long, 5–20 cm. broad ; flowers large, on long pedicels ; sepals lanceolate, up to 3·5 cm. long ; outer petals up to 10 cm. long ; fruit 10–15 cm. diam. .. .. 4. *Myristica*

Bracts and sepals not crispate on the margins ; leaves obovate to oblong, obtuse at the base, shortly acuminate, 15–30 cm. long, 7–12 cm. broad ; sepals orbicular, 1 cm. long ; outer petals ovate, 2·5 cm. long ; fruit ribbed, globose, 7·5 cm. diam. .. .. 5. *brevipes*

1. **Monodora Unwinii** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A tree.
S. Nigeria : Benin ! Exsicc.— *Unwin* 45.

2. **M. tenuifolia** *Benth.*—F.T.A. 1 : 38 ; Stapf 576 ; Holl. 1 : 51 ; Chev. Bot. 12. A tree, up to 50 ft., with whitish-yellow purple-spotted flowers.
Generally distributed in the forest from Sierra Leone to Cameroons and Fernando Po, extending to N. Nigeria ; flowering Jan. to Mar. (See Appendix).

3. **M. crispata** *Engl. & Diels* in Notizbl. Bot. Gart. Berl. 2 : 301. *M. angolensis* Oliv.—F.T.A. 1 : 38, partly ; Holl. 1 : 51. A shrub or tree, up to 30 ft. ; outer petals purple-variegated, inner rose and white.
Liberia : Gola Forest ! S. Nigeria : Calabar ! Oban ! Eket ! Degema ! Also in Cameroons. Exsicc.— *Thomson* 89. *Talb.* 3221.

4. **M. Myristica** *Dunal*—F.T.A. 1 : 37 ; Stapf 576 ; Holl. 1 : 51 ; Chev. Bot. 11. A tree, up to 60 ft., with large fragrant flowers ; calyx red-spotted ; petals yellow and red, the three inner spotted outside, red and spotted green inside ; fruit spherical, green, the size of an orange.
Commonly distributed throughout the forests from Sierra Leone (according to Engler and Diels) to Cameroons and the tropical islands, Angola and Uganda ; flowering Nov. to Mar. (See Appendix).

5. **M. brevipes** *Benth.*—F.T.A. 1 : 39. *M. Preussii* Engl. & Diels. A tall shrub or tree, up to 60 ft. ; petals yellow-red, veined or spotted ; often found in open stony bush country.
French Guinea : ? locality ! Sierra Leone : Scarcies R. (Jan.) ! Limba (April) ! Liberia : Kakatown ! S. Nigeria : Iddo (Dec.) ! Oban ! Eket ! Barombi ! Johann-Albrechtshöhe (Dec., Feb.) ! Victoria (Jan., Mar.) ! Cameroons Mt. : Buea (Mar.). Fernando Po (Jan.) ! Also in French Cameroons and Princes Isl. Exsicc.—*Mann* 164 (partly). *Talb.* 145 ; 3100. *Preuss* 444 ; 1314. *Staudt* 648. *Kalbreyer* 88.

4. MONIMIACEAE

Trees or shrubs, rarely climbers, usually fragrant, with opposite, or rarely alternate, entire or serrate, coriaceous leaves with pellucid dots ; stipules absent.

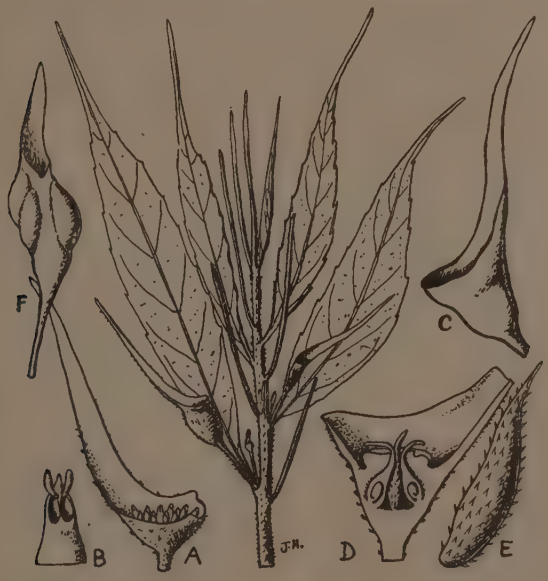

FIG. 12.—GLOSSOCALYX LONGICUSPIS *Benth.* (MONIMIACEAE).

A, male flower.
B, anther.
C, female flower.
D, section of same.
E, mature carpel.
F, fruit.

Partly after Perkins & Gilg.

Flowers actinomorphic, rarely oblique, hermaphrodite, polygamous or unisexual, cymose or racemose, rarely solitary, small or medium-sized ; inflorescence axillary or rarely terminal. Perianth inferior, with 4 to many often connivent teeth or lobes in 2 to many series and imbricate, equal, or the outer sepaloid and the inner petaloid, rarely obsolete. Disk adnate to the perianth-tube. Stamens

numerous or few in 1–2 series; filaments very short, often flattened, with or without glands at the base; anthers erect, 2-celled, opening by a longitudinal slit or by valves from the base upwards. Female fl.: staminodes present or none; carpels several or rarely solitary, 1-celled; style short or elongated; stigma terminal; ovule solitary, erect or pendulous. Carpels separate in fruit, enclosed by the perianth or the latter deciduous, indehiscent, often drupaceous. Seed erect or pendulous; testa membranous; endosperm fleshy; embryo small to half as large as the endosperm; cotyledons erect or spreading.

Distributed in tropical and subtropical regions mainly of the Southern Hemisphere, absent from India (except Ceylon and Burma), and very rare in Africa. Recognised by the gland-dotted exstipulate leaves, apetalous flowers with the staminal disk adnate to the perianth-tube, 2-celled anthers opening by either slits or flaps (as in *Lauraceae*), the carpels separate in fruit, the endospermic seeds, and usually small embryo.

Chloropatane Engl. and *Plagiostyles* Baill., formerly included in *Monimiaceae*, are now placed in *Euphorbiaceae*.

GLOSSOCALYX Benth.—F.T.A. 6, 1 : 167.

Trees or shrubs. Leaves alternate, oblong to oblong-obovate, cuspidate-acuminate, subentire, exstipulate. Flowers dioecious, few in axillary fascicles, pedicellate. Perianth-tube companulate, limb oblique, one lobe produced on one side into a tongue-like process, the other lobes small and deltoid.

Leaves equal-sided and narrowed at the base, with scattered stellate hairs below; petiole 0·5–1 cm. long; perianth-limb linear-lanceolate, up to 2·5 cm. long 1. *longicuspis*

Leaves rounded or slightly cordate and unequal at the base, sparingly strigose beneath with often bifurcate hairs; petiole up to 5 mm. long:

Perianth-limb narrowed from near the base, more or less linear, up to 1 cm. long; pedicels up to 7 mm. long .. .. 2. *Staudtii*

Perianth-limb triangular, up to 5 mm. long; pedicels up to 4 mm. long 3. *brevipes*

1. **G. longicuspis** *Benth.*—F.T.A. 6, 1 : 167; Perkins & Gilg in Engl. Pflanzenr. Monim. 116, fig. 28; Thonner Fl. Pl. Afr. t. 50. A tree, 30–40 ft. high; young branches furnished with very short hairs.
Fernando Po! Also in Cameroons and Spanish Guinea. Exsicc.—*Mann* 1428.

2. **G. Staudtii** *Engl.*—F.T.A. 6, 1 : 168; Perkins & Gilg l.c. 117. A shrub, up to 24 ft. high; branches slightly flexuous, pithy; flowers with an odour of nutmeg.
S. Nigeria: Oban! Johann-Albrechtshöhe (Jan.)! Exsicc.—*Talb.* 84. *Staudt* 808.

3. **G. brevipes** *Benth.*—F.T.A. 6, 1 : 168; Perkins & Gilg l.c. 116. A shrub, 10 ft. high.
S. Nigeria: Cameroons River (Jan.)! Exsicc.—*Mann* 722; 2196.

5. LAURACEAE

Trees or shrubs, very rarely twining parasitic herbs, all parts with aromatic oil-glands. Leaves alternate, rarely opposite or subopposite, coriaceous and evergreen, variously nerved; stipules absent. Flowers small, greenish or yellowish, usually cymose or racemose, hermaphrodite, polygamous or dioecious, actinomorphic. Calyx usually inferior; tube sometimes enlarging in fruit; lobes usually 6, imbricate. Petals absent. Stamens typically in 4 whorls, often the fourth row suppressed or reduced to staminodes; filaments sometimes glandular at the base, very rarely the glands fused into a disk; anthers continuous with the filament, 2-or 4-valved, cells superposed or more or less collateral, opening from the base upwards by flaps, introrse or sometimes the third whorl extrorse. Ovary superior, rarely inferior, 1-celled; style terminal, simple; stigma small. Ovule solitary, pendulous. Fruit baccate or drupaceous. Seed pendulous, without endosperm; testa membranous; embryo straight; cotyledons thick, fleshy; radicle superior.

Generally distributed in tropical and subtropical regions, but comparatively rare in Africa. Readily recognised by the simple aromatic evergreen leaves without stipules, the absence of petals, the characteristic dehiscence of the anthers, and the seed without endosperm.

Trees and shrubs with normal foliage:

Anthers 2-valved; fruit superior; flowers hermaphrodite .. .. 1. **Tylostemon**

Anthers 4-valved, the valves collateral; fruit inferior; flowers dioecious 2. **Hypodaphnis**

Leafless slender parasitic climbers; stems filiform, glabrous to tomentose; flowers small, spicate, with green receptacle and white calyx .. .. 3. **Cassytha**

Besides the above indigenous genera the following introduced plants are met with: *Persea gratissima* Gaertn. f., the Avocado Pear, a native of tropical America, a dessert or salad fruit; *Cinnamomum Camphora* Nees & Eberm., the Camphor tree, and *C. zeylanicum* Nees, Cinnamon tree, natives of the Far East. (See Appendix).

1. TYLOSTEMON Engl.—F.T.A. 6, 1 : 173.

Inflorescences short and rather dense, up to 3 times as long as the petiole; leaves elliptic-obovate, shortly acuminate, cuneate at the base, 12–17 cm. long, 4·5–7 cm. broad; lateral nerves about 8–10 on each side of the midrib .. 1. *confertus*

Inflorescences many times as long as the petiole, usually lax:

Flowers densely pubescent or tomentellous:

Stamens of the third row bearing extrorse anthers:

Acumen of the leaves up to 2 cm. long; ovary long-hairy; staminodes reduced to ovate glands .. .. 2. *Preussii*

Acumen of the leaves up to 7 mm. long; ovary glabrous; staminodes minute, linear, villous .. .. 3. *Talbotiae*

Stamens of the third row barren, usually conical or cylindrical:

Inflorescence 5–7 cm. long; flowers small, about 2 mm. long, on very short pedicels 4. *gabonensis*

Inflorescence 10–18 cm. long; flowers 2–4 mm. long, on distinct pedicels:

Style enclosed in bud; flowers about 4 mm. long .. .. 5. *caudatus*

Style exserted in bud; flowers 2–3 mm. long .. .. .. 6. *euryneurus*

Flowers minutely and rather loosely puberulous or glabrous:

Leaves subopposite, 10–22 cm. long, 4–10 cm. broad; flowers about 3 mm. long, glabrous except at the ciliate margins .. .. 7. *Mannii*

Leaves alternate:

Flowers small, 2–2·75 mm. long:

Leaves about 25 cm. long, up to 11 cm. broad; perianth almost glabrous outside 8. *macrophyllus*

Leaves 8–12 cm. long; perianth glabrous except at the ciliolate margins 9. *myrciifolius*

Leaves 12–18 cm. long; perianth minutely puberulous.. .. 10. *foliosus*

Flowers larger, 3 mm. long or more:

Leaves over 15 cm. long; perianth sparingly but evenly puberulous 11. *Staudtii*

Leaves under 15 cm. long; perianth glabrous or nearly so .. .. 12. *longipes*

1. **T. confertus** *S. Moore* in Journ. Bot. 1914 : 33. A shrub; branches and branchlets subterete, striate, glabrous.
S. Nigeria: Oban! Eket! Exsicc.—*Talb.* 3399.

2. **T. Preussii** *Stapf*—F.T.A. 6, 1 : 176. A shrub, with glabrous green branchlets.
S. Nigeria: Between Victoria and Bimbia. Exsicc.—*Preuss* 1272 (not seen).

3. **T. Talbotiae** *S. Moore* in Cat. Talb. Nig. Pl. 94. A tall shrub; branches subterete, glabrous, with ashen-grey bark.
S. Nigeria: Oban! Exsicc.—*Talb.* 1539.

4. **T. gabonensis** *Stapf*—F.T.A. 6, 1 : 183. A shrub; branches glabrous, drying brown or blackish.
S. Nigeria: Old Calabar (Feb.)! Also in Gabon. Exsicc.—*Mann* 2255.

5. **T. caudatus** *Stapf*—F.T.A. 6, 1 : 181. *Afrodaphne caudata* Stapf. A tree? branchlets drying blackish; leaves oblong, long-acuminate, up to 8 in. long, glabrous, coriaceous; panicles downy.
Liberia: Sinoe Basin! Exsicc.—*Whyte.*

6. **T. euryneurus** *Stapf*—F.T.A. 6, 1 : 182. *Afrodaphne euryneura* Stapf. Like the last; branchlets drying blackish; leaves shortly acuminate or sharp-pointed.
Liberia: Sinoe Basin! Exsicc.—*Whyte.*

7. **T. Mannii** *Stapf*—F.T.A. 6, 1 : 178; Chev. Bot. 542. A tree, about 20 ft. high; branches moderately stout, the old grey, the young drying greenish-brown, striate, somewhat compressed upwards.
Sierra Leone: Mofari (Jan.)! Mussaiya (Mar.)! Liberia: ? locality! Ivory Coast: various localities. Gold Coast: Nkwanta, W. frontier (Sept.)! Axim (July). Also in Cameroons, Ubangi-Shari and Gabon. Exsicc.—*Sc. Elliot* 4400; 5125. *Chipp* 367. *Cook* 156. (See Appendix).

8. **T. macrophyllus** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A shrub or tree, with smooth branchlets; sometimes climbing?
S. Nigeria: Oban! Exsicc.—*Talb.* 2301; 2322.

9. **T. myrciifolius** *S. Moore* l.c. 95. A shrub with glabrous subterete branches covered with grey bark.
S. Nigeria: Oban! Exsicc.—*Talb.* 2334.

10. **T. foliosus** *S. Moore* l.c. 96. A shrub with glabrous subterete branches and brown bark.
S. Nigeria: Oban! Exsicc.—*Talb.* 2342.

11. **T. Staudtii** *Stapf*—F.T.A. 6, 1 : 177. A shrub; branchlets very minutely rusty-pubescent when quite young.
S. Nigeria: Johann-Albrechtshöhe (Feb.)! Exsicc.—*Staudt* 857.

12. **T. longipes** *Stapf*—F.T.A. 6, 1 : 179. A tree, 20 ft. high, glabrous with the exception of the fulvous-velvety leaf-buds; branches drying greenish-brown.
S. Nigeria: Calabar (Feb.)! Exsicc.—*Mann* 2255; 2255a.

Imperfectly known Species.

T. crassifolius *Engl.*—F.T.A. 6 : 185. A tree, 60–120 ft.
S. Nigeria: Johann-Albrechtshöhe (Dec.)! Exsicc.—*Staudt* 505 (drawing in Herb. Kew).

2. HYPODAPHNIS Stapf—F.T.A. 6, 1 : 185.

A tree; young parts rusty-pubescent. Leaves elliptic to obovate, acutely acuminate, shortly acute at the base, 12–25 cm. long, up to 10 cm. broad, slightly puberulous on the nerves; lateral nerves 4–5 on each side of the midrib, ascending; tertiary nerves

subparallel, at length conspicuous ; petiole up to 3–5 cm. long ; panicle subcorymbose, 3·5–8 cm. long, many-flowered, finely rusty-pubescent all over *Zenkeri*

Hypodaphnis Zenkeri *Stapf*—F.T.A. 6, 1 : 185 ; Ic. Pl. t. 2938. A tree, 20–30 ft. high. S. Nigeria : Johann-Albrechtshöhe ! Also in French Cameroons. Exsicc.—*Staudt* 961.

3. CASSYTHA Linn.—F.T.A. 6, 1 : 188.

Twining parasitic herbs, with the leaves reduced to minute scales, adhering to the host by means of haustoria ; flowers white, small, loosely spicate, often rusty-pubescent ; bracteoles ciliolate ; outer perianth-segments similar to the bracteoles, the inner broadly ovate-oblong, longer than the outer ; fruits crowned with the persistent perianth-limb, 4–6 mm. in diam. .. .. *filiformis*

C. filiformis *Linn.*—F.T.A. 6, 1 : 188 ; Chev. Bot. 543.
Very common throughout the area and in the tropics generally. (See Appendix).

FIG. 13. — HYPODAPHNIS ZENKERI *Stapf* (LAURACEAE).

A, flower in vertical section.

B, stamens and a gland.

C, anther.

6. HERNANDIACEAE

Trees or shrubs, sometimes scandent, with alternate, simple or digitately compound leaves ; stipules absent. Flowers hermaphrodite, or monoecious or polygamous by abortion, actinomorphic, arranged in axillary corymbose or paniculate cymes, bracteate or not. Calyx with 3–5 valvate subequal segments in two whorls or rarely 4–8 in one whorl. Stamens 3–5 in a single whorl, when the perianth is double opposite the outer segments, often 4 ; anthers 2-celled, opening introrsely or laterally by 2 valves ; staminodes gland-like, in one or two whorls outside the stamens, or absent, those of the outer whorl in pairs at the base of the filaments, those of the inner whorl alternate with the stamens. Ovary single, inferior, 1-celled ; ovule solitary, pendulous. Fruit dry, more or less ribbed, either with 2–4 wings on the body or with two terminal wings formed by enlarged perianth-segments, or wingless but enclosed in the inflated receptacle. Seed solitary, without endosperm ; testa leathery ; embryo straight ; cotyledons large, plano-convex or flat and twisted around the radicle.

Distributed in the tropics of both hemispheres, mainly near the coasts, and especially on oceanic islands.

Leaves simple, sometimes peltate ; fruits surrounded by the inflated calyx ; flowers monoecious ; calyx-lobes 6–8 ; petals absent ; stamens 3–4 1. **Hernandia**

Leaves digitately compound ; fruits with 2–4 broad lateral wings ; flowers hermaphrodite ; calyx-lobes 5 ; petals 5 ; stamens 5 .. .. .. 2. **Illigera**

1. HERNANDIA Linn.—F.T.A. 6, 1 : 191.

Tree ; branchlets stout, minutely puberulous ; leaves ovate, rounded or very slightly cuneate at the base, up to 22 cm. long and 13 cm. broad, firmly papery, glabrous, 5-nerved at the base ; petiole up to 12 cm. in fruiting specimens ; corymbs many-flowered, on stout peduncles ; fruits broadly ellipsoid, ribbed, 2·5 cm. long, the calyx up to about 4 cm. long .. .. *beninensis*

H. beninensis *Welw.*—F.T.A. 6, 1 : 192. A tree, 30–40 ft. high.
Fernando Po ! Also in the island of St. Thomas. Exsicc.—*Mann* 1418.

2. ILLIGERA Blume—F.T.A. 6 : 192.

A climbing shrub ; leaves digitately 3–5-foliolate ; leaflets elliptic, rounded at each end or slightly acuminate at the apex, 5–8 cm. long, 3·5–6 cm. broad, slightly pilose below ; lateral nerves 2–3 on each side of the midrib, ascending ; petiole often tendriliform, up to 10 cm. long ; petiolules about 2 cm. long ; cymes paniculate,

FIG. 14.

A, fruit of Hernandia beninensis *Welw.* (Hernandiaceae). B, Illigera pentaphylla *Welw.* (Hernandiaceae), branch with leaf and inflorescence. C, leaf. D, fruit.

axillary, shortly tomentose, the flowers merely puberulous or nearly glabrous ; fruits 2·5 cm. long, about 10 cm. from tip to tip of the wings, finely puberulous *pentaphylla*

I. pentaphylla *Welw.*—F.T.A. 6, 1 : 192 ; Chev. Bot. 544.
Ivory Coast: Bouroukrou (Dec.–Jan.). Gold Coast: Aburi hills (June) ! Sukyen (fr. June) ! Extends into French Cameroons, Angola and Uganda. Exsicc.—*Brown* 317. *Thomson* 94.

7. MYRISTICACEAE

Trees, often large and frequently aromatic. Leaves alternate, entire, penninerved, often with pellucid dots ; stipules absent. Flowers small, dioecious, apetalous, fascicled, racemose, umbellate or capitate. Calyx 3- (rarely 2–5-) lobed, funnel-shaped to globose or saucer-shaped, lobes valvate. Male flower : stamens 2–30 ; filaments united into a column ; anthers 2-celled, free or united in a mass, dehiscing longitudinally ; rudimentary ovary absent. Female flower : staminodes absent ; ovary superior, sessile, 1-celled ; stigma subsessile ; ovule 1, almost basal. Fruit fleshy, usually dehiscing by two valves. Seeds erect, with a thin or fleshy, sometimes laciniate, often coloured aril ; endosperm copious, replete with fat and often starch, mostly ruminate ; embryo small ; cotyledons ascending or spreading, sometimes connate.

Generally distributed in the tropics, comparatively rare in Africa, abundant in Tropical Asia and America. Recognised by habit and aromatic leaves, small dioecious flowers, the seeds often rich in fat and conspicuously arillate.

Lateral nerves of the leaves prominent, often numerous ; endosperm ruminate :

Leaves with 15–60 usually very marked lateral nerves on each side of the midrib ; male flower-heads paniculate or in umbels without a common involucre ; seeds solid in the middle :

Male flowers sessile in small heads arranged in a divaricate panicle ; anthers 2–4 ; fruit oblong, 3–4 cm. long ; aril of seed laciniate .. .. **1. Pycnanthus**

Male flowers pedicellate, in small head-like umbels, the umbels solitary or crowded in reduced panicles ; anthers 6–10 ; fruit depressed ; aril entire **2. Scyphocephalium**

Leaves with 7–10 slender curved lateral nerves on each side of the midrib ; male flower-heads at first enclosed in a common involucre which falls away except the persistent disk-like base ; seed with a longitudinal cavity in the middle **3. Coelocaryon**

Lateral nerves faint, rather few ; endosperm not ruminate ; flower-heads almost sessile in the leaf-axils, solitary or in small clusters ; aril entire **4. Staudtia**

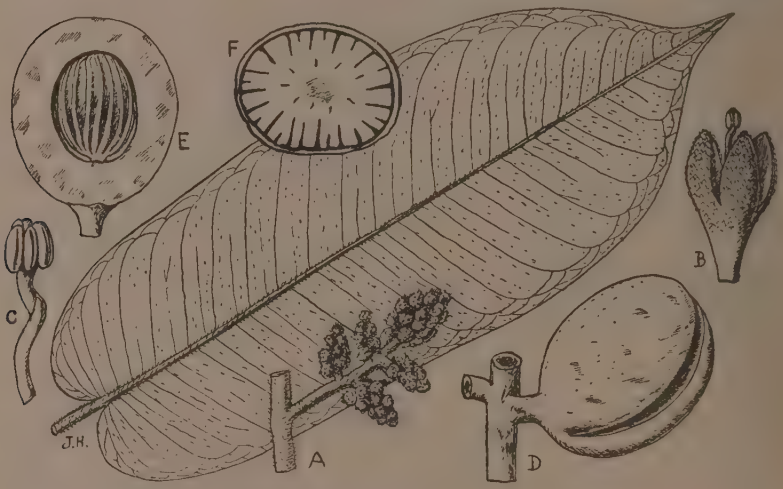

FIG. 15.—PYCNANTHUS KOMBO *Warb.* (MYRISTICACEAE).

A, portion of male inflorescence. B, male flower. C, staminal column. D, fruit. E, fruit in longitudinal section showing seed and aril. F, cross-section of seed.

1. PYCNANTHUS Warb.—F.T.A. 6, 1 : 157.

Leaves cordate at the base, with 20–35 prominent lateral nerves on each side ; indumentum of the leaves rusty, composed of branched hairs ; male flower-heads about 5 mm. in diam., crowded .. .. 1. *kombo*

Leaves cordate at the base, with 40–60 prominent lateral nerves on each side ; indumentum of leaves of minute papillous stellate hairs ; male flower-heads about 3 mm. in diam., laxly arranged .. .. 2. *microcephalus*

Leaves shortly cuneate at the base, with 15–18 rather obscure lateral nerves on each side ; indumentum merely papillous below ; male flower-heads about 3 mm. in diam., laxly arranged .. .. 3. *Dinklagei*

1. **P. kombo** *Warb.*—F.T.A. 6, 1 : 158 ; Holl. 4 : 558 ; Chev. Bot. 541 ; Thonner Fl. Pl. Afr. t. 49. A tree, 80–120 ft. high, with long straight bole up to 15 ft. in girth, and usually flat crown ; the wood exudes a reddish-tinged latex when cut.
French Guinea : Timbo (Dec.) ! Sierra Leone : Sherboro ! Commendi (Nov.) ! Bo (Feb.) ! Ivory Coast (various localities) ! Gold Coast : Sunyani (Jan.) ! between Amfei and Alafanjo (June) ! Adeambra ! Togo : Alakgama. N. Nigeria : Agaie (Nov.–Jan.) ! S. Nigeria : Ibadan (Dec. Jan.) ! Asaba ! Extending to Ubangi, Angola and Uganda. Exsicc.—*Lane-Poole* 174. *Aylmer* 266. *Chipp* 73. *Yates* 3. *Punch* 126. *Dodd* 402.

2. **P. microcephalus** *Stapf*—F.T.A. 6, 1 : 159. A tree, 60–80 ft. high.
S. Nigeria : Oban ! Fernando Po (Nov.) ! Also in Cameroons and Spanish Guinea. Exsicc.—*Mann* 572.

3. **P.** (?) **Dinklagei** *Warb.*—F.T.A. 6, 1 : 159. A tree, about 30 ft. high, with pendulous branches (F.T.A.) or a woody climber (Lane-Poole and Aylmer).
Sierra Leone : Bumbu (Feb.) ! Falaba (April) ! Liberia : Grand Bassa ! Exsicc.—*Dinklage* 2096.

2. SCYPHOCEPHALIUM Warb.—F.T.A. 6, 1 : 160.

A tree ; leaves slightly falcate, oblong to oblanceolate, acuminate, obtuse at the base, 14–30 cm. long, up to 13 cm. broad, papery, glabrescent ; lateral nerves up to 20 pairs, prominent below ; male flowers in dense head-like axillary branched inflorescences, fulvous ; peduncles stout .. .. *Mannii*

S. Mannii *Warb.*—F.T.A. 6, 1 : 161 ; Chev. Bot. 542. A tree, 40–100 ft. high.
S. Nigeria : Calabar ! Oban ! Eket ! Cameroons River (Jan.) ! Also in French Cameroons. Exsicc.—*Mann* 752 ; 2290. *Talb.* 1316 ; 3145.

3. COELOCARYON Warb.—F.T.A. 6 : 162.

Lateral nerves 8–12 pairs ; leaves elliptic or obovate-elliptic, 18–22 cm. long, 6–9 cm. broad ; fruits obtuse ; seed 3 cm. long, 1·5 cm. broad ; testa deeply grooved 1. *Preussii*

Lateral nerves 6–8 pairs ; leaves broadly obovate-elliptic, 10–15 cm. long, 5–7 cm. broad ; fruits beaked, 2·5–3 cm. long ; testa not grooved .. .. 2. *oxycarpum*

1. **C. Preussii** *Warb.*—F.T.A. 6, 1 : 163. A tall tree, with drooping branches ; branchlets terete, rufous-puberulous near the tips.
S. Nigeria : Victoria ! Also in French Cameroons. Exsicc.—*Preuss* 331.
2. **C. oxycarpum** *Stapf*—F.T.A. 6, 1 : 164 ; Chev. Bot. 542. *C. cuneatum* A. Chev. l.c., not of Warb. A tree with terete glabrous branchlets.
French Guinea : Farana (fr. May) ! Ivory Coast : Dabou (Feb.) ! Exsicc.—*Chev.* 13178 ; 13425 16213. (See Appendix).

4. STAUDTIA Warb.—F.T.A. 6, 1 : 164.

Fruits stipitate, 4 cm. long, 2 cm. broad ; branchlets ribbed, glabrous ; leaves oblong or oblong-lanceolate, acuminate, 10–18 cm. long, 3–6·5 cm. broad, glabrous, the midrib prominent on each side ; petiole broadly channelled above 1. *stipitata*

Fruits not stipitate, 5 cm. long, 4 cm. broad ; branchlets and leaves as above 2. *kamerunensis*

1. **S. stipitata** *Warb.*—F.T.A. 6, 1 : 165. A hard-wooded tree, reaching over 100 ft. in height.
S. Nigeria : Johann-Albrechtshöhe ! Exsicc.—*Staudt* 484.
2. **S. kamerunensis** *Warb.*—F.T.A. 6, 1 : 165. A tree, reaching over 100 ft. in height ; wood hard and reddish.
S. Nigeria : Victoria Botanic Garden. Also in French Cameroons. Exsicc.—*Winkler* 1090 ; 1335 (not seen).

8. RANUNCULACEAE

Perennial (rarely annual) herbs with alternate leaves, or rarely shrubs or climbers with opposite leaves ; stipules absent. Indumentum of simple hairs. Flowers hermaphrodite, hypogynous, usually actinomorphic. Perianth usually double, of calyx and corolla, or rarely the calyx petaloid and the petals absent. Sepals imbricate or valvate. Petals when present often with a nectariferous claw. Stamens numerous, free from one another ; anthers dehiscing longitudinally. Carpels numerous, free or rarely partially connate, with a slightly bifid style or subsessile stigma. Ovules numerous or solitary. Fruit a bunch of follicles, rarely baccate, or of dry achenes with often persistent and elongated styles. Seeds small, usually smooth ; embryo very small, at the base of horny or fleshy endosperm.

Abundant in temperate and cold regions of the Northern, comparatively rare in the Southern Hemisphere, and very rare in the tropics ; poorly represented in our area, but interesting isolated species of northern genera are found at high altitudes in the mountains of East and South Africa. *Clematopsis* is endemic to Africa and Madagascar, and the African species of *Thalictrum*, with their long, thread-like pedicels, differ markedly from most of the species from the Northern Hemisphere.

Petals present, yellow ; leaves ternately compound .. .. .. **1. Ranunculus**

Petals absent :

Sepals green, small, imbricate ; stamens few, with glabrous filaments ; leaves alternate, compound, with small and maidenhair-fern-like leaflets ; pedicels very slender and much elongated in fruit ; fruits solitary, ribbed, not hairy .. **2. Thalictrum**

Sepals petaloid, large, induplicate-valvate or partly imbricate ; stamens numerous, with hairy filaments ; leaves opposite, simple or compound ; pedicels not elongated ; fruits in a cluster, hairy and with long hairy tails :

Low anemone-like herbaceous savannah plants arising from woody rhizomes ; sepals partly imbricate and partly valvate ; flowers mostly solitary **3. Clematopsis**

Tall climbing forest plants ; sepals induplicate-valvate ; flowers often paniculate **4. Clematis**

Besides the above genera, Chevalier (Bot. 4) records that *Nigella sativa* Linn. is cultivated in gardens at Timbuktu. In 1917 Dr. Unwin communicated to Kew a specimen of *Delphinium*, probably the first gathered in West Africa, from the Bambuto Range at 6,000 ft. in the Dschang District of the Cameroons, just south of our area. This is either the East African *D. dasycaulon* Fres. or a new and closely allied species, but the material at present available is not sufficient to decide the question. This plant may also occur on the Cameroons Mt.

1. **RANUNCULUS** Linn.—F.T.A. 1 : 8.

A small herb with creeping stems rooting at the nodes ; leaves ternately compound, segments deeply trilobed, pilose ; pedicels 1·5 cm. long ; sepals green, deciduous ; petals 7 mm. long ; stamens 10–12 ; achenes suborbicular, 3 mm. long, closely pitted *extensus*

R. extensus *Schule* ex *Engl.* in Abh. Preuss. Akad. Wiss. 1891 : 218. *R. pinnatus* Poir. var. *extensus* Hook. f.—F.T.A. 1 : 10.
Fernando Po : Clarence Peak, 8,500 ft. (Dec.) ! Exsicc.—*Mann* 618.

FIG. 16.—CLEMATOPSIS NIGERICA *Hutch.* (RANUNCULACEAE).
A, stamen. B, carpel. C, stigma and part of style.

2. **THALICTRUM** Linn.—F.T.A. 1 : 8.

A slender herbaceous plant 1–4 m. high, with numerous small leaflets ; pedicels very long and filiform, much elongating in fruit ; sepals small and greenish ; petals absent ; stamens 7–8, slightly exserted ; fruits prominently ribbed, capped by a large, persistent style .. .. *Mannii*

T. Mannii *Hutch.* in Kew Bull. 1927, ined.—F.T.A. 1 : 8, under *T. rhyncocarpum* Dillon & A. Rich.
Fernando Po : Clarence Peak, 6,000–10,000 ft. ! Cameroons Mt., 7,000 ft. (fr. Nov.) ! Exsicc.—*Mann* 293 ; 1999. *Deistel* 644.
Very closely allied to *T. rhyncocarpum* Dillon & A. Rich. from East Tropical Africa, which has only 5 stamens long-exserted from the calyx.

3. **CLEMATOPSIS** Bojer ex Hutch. in Kew Bull. 1920 : 12.

Leaves mostly trifoliolate, the terminal leaflet toothed only in the upper part ; flowers mostly 3 to each shoot, with a pair of small foliaceous bracts about 3 cm. below the calyx .. .. 1. *Oliveri*

Leaves pinnately divided, the terminal lobe deeply partite ; flowers solitary to each shoot, with a long nude peduncle about 15 cm. long .. .. 2. *nigerica*

1. **Clematopsis Oliveri** *Hutch.* in Kew Bull. 1920: 20. *Clematis chrysocarpa* Oliv.—F.T.A. 1 : 5, partly, not of Welw. A low undershrub from an underground woody rhizome ; flowers much resembling *Anemone*. N. Nigeria : Bauchi Plateau, 3,000–4,500 ft. (June) ! Naraguta hills ! Also Uganda to Nyasaland. Exsicc.—*Lely* 732.
2. **C. nigerica** *Hutch.* in Kew Bull. 1927, ined. Habit as in the preceding. N. Nigeria : Bauchi Plateau, 3,000–4,500 ft. ! Exsicc.—*Dent Young* 1.

4. CLEMATIS Linn.—F.T.A. 1 : 4.

Flowers large, 1–3 in each inflorescence ; sepals yellow, about 5 cm. long ; leaflets ovate, averaging about 10 cm. long and 5 cm. broad, with short acute teeth 1. *grandiflora*

Flowers small and numerous, in a panicle ; sepals white or greenish-white, less than 1·5 cm. long ; leaflets mostly below 8 cm. long and 5 cm. broad :

Leaflets usually rather coarsely lobed as well as toothed, shortly pubescent below ; sepals not nerved .. .. 2. *hirsuta*

Leaflets only serrate-dentate, glabrous or nearly so below ; sepals 3-nerved 3. *altissima*

1. **C. grandiflora** *DC.*—F.T.A. 1 : 7 ; Holl. 1 : 47 ; Chev. Bot. 3. A climber in low bush. Sierra Leone : Regent (Dec.) ! Freetown and environs ! Kukuna, Scarcies R. (Jan.) ! Ronietta (Nov.) ! French Guinea : several localities (Dec.) ! Ivory Coast : Indénié (Mar.) ! S. Nigeria : Obeyon, Cross R. (Jan.) ! Oban ! Johann-Albrechtshöhe ! Cameroons Mt. : Buea ! Also in French Cameroons, Angola and Uganda. Exsicc.—*Sc. Elliot* 3940 ; 4670. *Farmar* 258. *Talb.* 239. *Staudt* 483. *Deistel* 169. (See Appendix).
2. **C. hirsuta** *Guill. & Perr.*—F.T.A. 1 : 6, and Holl. 1 : 47, as *C. Thunbergii* Steud. ; Chev. Bot. 3. *C. Thunbergii* A. Chev. l.c., not of Steud. A climber, up to 20 ft., over trees and rocks. French Sudan : Dioubéla (Dec.) ; Balani (Oct.). Senegal : Niayes (Dec.) ! Between Thiès and Mt. Rowland (Dec.) ! Gambia ! French Guinea : Rio Nunez ! Ymbo-Orobé (Nov.). Diaguissa (Dec.). Togo ! N. Nigeria : Lokoja, Patti (Oct.) ! Kabba (Oct.) ! Sokoto ! S. Nigeria : Lagos ! Oloke Meji ! Exsicc.—*Perrottet. Ingram. Brown-Lester* 20 ; 52. *Millen* 173. *Foster* 143 ; 368. *Chev.* 18017. *Buettner* 307. (See Appendix)
3. **C. altissima** *Hutch.* in Kew Bull. 1923 : 180. A forest-climber ; up to 120 ft. high. Cameroons Mt., 4,000–8,000 ft. (Dec.–Jan.) ! Fernando Po, 4,000–8,000 ft. (Nov.–Dec.) ! Exsicc.—*Mann* 576 ; 1245 ; 2170. *Johnston* 28 ; 103. *Deistel* 154.

9. CERATOPHYLLACEAE

Aquatic submerged herbs with leafy floating branches. Leaves verticillate, variously divided with thread-like or linear segments. Flowers monoecious, solitary in the whorls, the males and females at separate nodes, sessile. Calyx thinly herbaceous, many-parted into narrow subvalvate segments often dentate or lacerate at the apex. Male flowers : stamens 10–22, crowded on a flat torus ; anthers almost sessile, erect, linear-oblong, 2-celled, cells parallel, opening lengthwise ; connective produced beyond the cells, thick and often coloured. Female flowers : staminodes 0 ; ovary sessile, ovoid, 1-celled ; style continuous with the ovary. Ovule 1, pendulous. Fruit a nut, ovoid or ellipsoid. Seed pendulous ; endosperm 0 ; embryo straight ; cotyledons oblong, equal ; radicle very short, the plumule already well developed and showing several leaves in the seed.

A well-marked family found in nearly all parts of the world.

CERATOPHYLLUM Linn.—F.T.A. 6, 2 : 326.

Characters of the family.

A glabrous perennial aquatic herb ; branches elongated, floating ; leaves in whorls of 5–12, more or less deeply divided into linear or filiform segments ; flowers small, axillary, sessile ; calyx-segments oblong ; fruit broadly ellipsoid, strongly warted and crowned with a long slender beak, about 5 mm. long without the beak *demersum*

C. demersum *Linn.*—F.T.A. 6, 2 : 326.
Senegal River ! S. Nigeria : Cradu Lake, Lagos Colony ! Exsicc.—*Perrottet. Barter* 3242.

10. NYMPHAEACEAE

Aquatic herbs with peltate or cordate leaves arising from a submerged prostrate rhizome. Flowers solitary, large and showy, often sweet-scented. Sepals 4–6, free or adherent to the receptacle. Petals numerous, imbricate, sometimes gradually passing into stamens. Anthers introrse, often flattened or petaloid, opening by a longitudinal slit. Carpels 8 or more, free and immersed in the receptacle or more or less united into an ovary of as many cells, inferior or semi-inferior. Receptacle large, fleshy, surrounding the ovary and with the

petals and stamens inserted on its side. Ovules numerous, attached to the sides of the dissepiments. Fruit many-celled, indehiscent, fleshy. Seeds often arillate; endosperm copious; embryo minute, with thick cotyledons.

A small family found in both temperate and tropical regions of both hemispheres. Water-lilies, easily recognised by their aquatic habit, floating leaves, showy flowers, several petals sometimes passing gradually into the numerous stamens, the numerous carpels, and endospermous seeds with minute embryo.

NYMPHAEA Linn.—F.T.A. 1 : 52; Gilg in Engl. Bot. Jahrb. 41 : 351.

Rhizome perennial. Leaves deeply cordate with numerous radiating nerves. Sepals 4. Petals indefinite in 2 or more series. Stamens numerous, inserted with the petals on the side of the receptacle. Ovary many-celled, with radiating sessile stigmas. Seeds numerous, immersed in pulp.

Leaves with entire or slightly undulate margins, glabrous or nearly so below; anther-connective usually tapered at the apex:

Leaves bearing a cluster of bulbils at the top of the petiole, 10–15 cm. long, 8–11 cm. broad; flowers about 10–12 cm. in diam. when spread out; connective of anthers shortly produced, conical, terete .. .. 1. *micrantha*

Leaves not bearing bulbils, or rarely only one or two:

Leaves small, at most up to 7 cm. long, with subobtuse basal lobes; flowers at most 4 cm. in diam. when spread out; outer stamens about 1 cm. long, with fairly long-produced connective .. .. 2. *Heudelotii*

Leaves over 8 cm. long, if rather small then the lobes more or less acute at the base:

Leaves 8–10 cm. long; flowers 6–8 cm. in diam. when spread out; outer stamens about 1 cm. long, with a rather shortly produced connective 3. *maculata*

Leaves 15–20 cm. long; flowers 10–12 cm. in diam. when spread out; outer stamens about 2 cm. long, with a long tapered produced connective .. 4. *rufescens*

Leaves sharply toothed, hairy below and with many strong nerves; anther-connective blunt and very shortly produced: .. .. 5. *Lotus*

1. **N. micrantha** *Guill. & Perr.* Tent. Fl. Senegamb. 16—Conard Water-lilies 146, t. 9, excl. syn. *N. rufescens*; Gilg in Engl. Bot. Jahrb. 41 : 356; Chev. Bot. 22. *N. stellata* A. Chev. l.c., not of Willd. The plant is viviparous from the second year, and the flowers vary in tint from white to bluish.
French Sudan: Tabacco (Jan.). Senegal: Cape Verde! Casamance, Koulaye (Feb.). Gambia! French Guinea: Douné (Dec.)! Ivory Coast: Kodiokoffi (Aug.)! Exsicc.—*Brunner* 126. *Perrottet* (no number). *Chev.* 14633; 22373.

2. **N. Heudelotii** *Planch.*—Conard l.c. 147, fig. 56; Gilg l.c. Of dwarfish habit, in small streams; flowers white to bluish.
Senegal! Gambia! Sierra Leone: Luseniya, Samu (Dec.)! French Guinea: Kankan (Sept.)! Also in French Cameroons. Exsicc.—*Heudelot* 844. *Sc. Elliot* 4085. *Poéguin* 1106. *Brooks.*

3. **N. maculata** *Schum. & Thonn.*—Gilg l.c. 357. *N. Lotus* A. Chev. Bot. 21, partly, not of Linn. *N. caerulea* A. Chev. Bot. 21, partly, not of Savigny. Flowers white or purplish.
French Sudan: Gourma (July)! Gold Coast: Cape Coast! Togo: near Lome! N. Nigeria: Katagum (Sept.)! Sokoto (Oct.)! Bauchi Plateau, 3,000–4,500 ft.! Also in Ubangi-Shari. Exsicc.—*Chev.* 14659; 24485. *Warnecke* 194.

4. **N. rufescens** *Guill. & Perr.* l.c. 15. *N. caerulea* A. Chev. Bot. 21, partly, not of Savigny. Flowers white to bluish-purple; leaves sometimes purple beneath.
Senegal: Dakar, etc. (Jan.–April)! N. Nigeria: Jebba! Bornu! Exsicc.—*Roger* 4. *Barter* 1037; 1064. *Talb.* 1243. *Chev.* 15833.

5. **N. Lotus** *Linn.*—F.T.A. 1 : 52; Conard l.c. 194, t. 16; Gilg l.c. 366; Chev. Bot. 21; Holl. 1 : 52. *N. Lotus* var. *sinoensis* Stapf in Journ. Linn. Soc. 37 : 82. *N. caerulea* A. Chev., partly, not of Savigny. Flowers white, sometimes bluish or purple-tinged.
Common from Senegal and French Sudan to Nigeria and Fernando Po. Also in North and Central Africa, Egypt, Madagascar, and in S.E. Europe, India and Malaya. (See Appendix).

11. MENISPERMACEAE

Twining or rarely erect shrubs or small trees, with the wood in cross-section showing broad medullary rays; root bitter. Leaves petiolate, alternate, exstipulate, usually simple, rarely trifoliolate or palmately lobed and nerved. Inflorescence cymose, paniculate, fasciculate, or rarely the flowers solitary, axillary or borne on the older wood. Flowers small, inconspicuously coloured, unisexual, dioecious, actinomorphic, rarely slightly zygomorphic. Male flowers: sepals in 2–4 series, imbricate, the outer smaller; petals usually smaller than the sepals, minute or absent, free or rarely united; stamens usually 6 or 3, or indefinite, when few opposite to the petals, free or variously united; anthers short. Female flowers: staminodes present or absent; carpels 3 or 6, rarely 1 or several, free, sessile or stipitate; stigma terminal, entire or lobed; ovules 2, soon reduced to 1 by abortion, attached to the ventral suture. Carpels drupaceous, with the scar of the style subterminal or near the base by excentric growth, sessile or stipitate; exocarp membranous or subcoriaceous, mesocarp

more or less pulpy, endocarp often bony and rugose, tuberculate or ribbed; seed often curved in the form of a horseshoe, with uniform or ruminate endosperm or without endosperm; embryo often curved, with a small radicle and flat or semi-terete cotyledons.

Generally distributed throughout the tropics, with a few species in warm temperate regions, in tropical Africa mainly occurring in forest areas. Easily recognised by the structure of the wood, the usually twining habit, the unisexual small flowers, often 3-merous or 6-merous, the stamens opposite the petals, the free carpels, and the often peculiar horseshoe-shaped fruit.

Leaves not peltate; carpels 3 or more:

Twiners:

Inflorescence simple, of axillary flowers or axillary fascicles or capitula, never branched; leaves never lobed:

Stamens 6–9, free or united only at the base:

Stamens free; ♂ flowers in small fasciculate cymules; ♀ flowers solitary; carpels 3–6; leaves small .. .. 1. **Cocculus**

Stamens united at the base; ♂ and ♀ flowers solitary or paired on simple pedicels; carpels 9; leaves large, ovate; stems hispid .. .. .. 2. **Synclisia**

Stamens 3, connate; flowers in small fasciculate capitula; carpels 3–4; leaves large, ovate-orbicular; stems softly tomentose.. .. .. 3. **Syrrheonema**

Inflorescence of simple, racemes (rarely slightly branched) or racemes of fascicles; stamens 6:

Stamens all free; flowers two or more in a fascicle on the axis of the raceme: petals present; endocarp of fruit verrucose .. .. 4. **Tinospora**

Stamens with 3 connate and 3 free filaments; flowers mostly paired on the axis of the raceme; petals present; endocarp of fruit partitioned 5. **Rhigiocarya**

Stamens all connate:

Flowers in fascicles on the axis of the raceme; petals present; endocarp of fruit wrinkled .. .. 6. **Chasmanthera**

Flowers solitary on the axis of the raceme; petals absent; endocarp of fruit verrucose 7. **Dioscoreophyllum**

Inflorescence compound, cymose or paniculate:

Flowers not minute, rather crowded in short cymes or clustered capitula; leaves not lobed:

Sepals glabrous or nearly so; petals well developed; flowers crowded into glomerules .. .. 8. **Tiliacora**

Sepals hairy; petals minute or absent; flowers usually in lax cymes 9. **Triclisia**

Flowers not minute, in very lax racemose panicles, the flowers subsessile on the lateral axes; leaves palmately 3–7-lobed; indumentum bristly 10. **Jatrorrhiza**

Flowers minute, in elongate very slender panicles:

Endocarp of fruit not echinate; leaves usually compound, trifoliolate 11. **Syntriandrium**

Endocarp of fruit echinate; leaves simple .. .. 12. **Kolobopetalum**

Erect shrubs or small trees; flowers solitary, fasciculate or in simple capitula:

Leaves heteromorphous, often pinnately lobed; flowers not capitulate; carpels several ? stamens 20 .. .. 13. **Sphenocentrum**

Leaves not lobed; flowers capitulate; carpels 3; stamens 5–9, free 14. **Penianthus**

Leaves peltate; carpel solitary:

Bracts minute, not enlarged in fruit; male sepals 6–8; petals free 15. **Stephania**

Bracts conspicuous, membranous or leafy in fruit; male sepals 4; petals united into a cup .. .. 16. **Cissampelos**

1. COCCULUS DC.—F.T.A. 1 : 44.

A prostrate or straggling and climbing shrub; branches elongate, slender, glabrous; leaves variable, entire or obscurely lobed, ovate to lanceolate, 1·5–3 cm. long, 0·5–1·5 cm. broad, subglaucous, glabrous; male flowers in axillary fascicles, female solitary or paired; pedicels slender; fruits subglobose, about 6 mm. in diam., red, often pruinose .. .. *pendulus*

C. pendulus *Diels* in Engl. Pflanzenr. Menisp. 237. *C. Leaeba* DC.—F.T.A. 1 : 44; Holl. 1 : 52; Chev Bot. 17. For full synonymy see Diels l.c.

Mauritania: Adrar. French Sudan: Kabara (July, Aug.)! Senegal: various localities! N Nigeria: Kuka (Jan.)! Bure, near L. Chad (fr. Dec.)! Extends to Angola and to Abyssinia and Arabia. Exsicc.—*Heudelot* (no number). *E. Vogel* 29. *Elliott* 114. (See Appendix).

2. SYNCLISIA Benth.—F.T.A. 1 : 49.

Woody climber; branches hispid; leaves ovate-lanceolate, cordate at the base, acuminate with a bunch of hairs at the apex, 15–18 cm. long, about 7 cm. broad,

5-nerved at the base, with prominent transverse nerves, hairy only on the nerves; petiole 3 cm. long, hispid; male and female flowers not known; fruit ellipsoid, 2 cm. long, 1·5 cm. broad, densely hispid .. .. *ferruginea*

Synclisia ferruginea *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *S. scabrida* Diels in Engl. Pflanzenr. Menisp. 87, partly, not of Miers; Chev. Bot. 17. *Anisocycla ferruginea* Diels.
French Guinea: Between Lola and Nyo (Mar.). Sierra Leone: ? locality! Liberia: Grand Bassa (fr. Aug.)! Ivory Coast: foot of Mt. Nouba (April); Upper Nuon (April). Exsicc.—*Sc. Elliot* 5751. *Chev.* 20989; 21134; 21157. *Dinklage* 1686.

3. SYRRHEONEMA Miers—F.T.A. 1 : 50.

A climbing shrub, about 10 m. long; branchlets tomentose; leaves rounded-ovate, slightly cordate or rounded at the base, acutely acuminate, the acumen densely hairy, 7–11 cm. long, 7–9 cm. broad, glabrescent and very finely reticulate, softly tomentose with stellate hairs below; petiole 4–6 cm. long, tomentose; male flowers white, in pedunculate clusters, the peduncles in axillary fascicles, up to 1·5 cm. long; female flowers not known .. .. *fasciculatum*

S. fasciculatum *Miers*—F.T.A.1 : 50; Diels in Engl. Pflanzenr. Menisp. 91, partly.
Fernando Po (Jan.)! Also in Cameroons. Exsicc.—*Mann* 192.

FIG. 17.—TINOSPORA BAKIS *Miers*. (MENISPERMACEAE).
A, flower-bud.
B, male flower.
C, outer sepal.
D, inner sepal.
E, petal.
F, stamen.
G, fruit.
H, cross-section of fruit.

4. TINOSPORA Miers—F.T.A. 1 : 43.

A slender glabrous twiner; older branches lenticellate; leaves broadly ovate, widely cordate at the base, shortly acuminate, 5–8 cm. long and broad, thinly papery, glabrous, digitately 7-nerved at the base; petiole 3–8 cm. long, slender; male inflorescences axillary, racemose, slender, up to 9 cm. long; pedicels fasciculate, 3–5 mm. long; flowers about 5 mm. in diam. .. .. *bakis*

T. bakis *Miers*—F.T.A. 1 : 43; Diels in Engl. Pflanzenr. Menisp. 140; Chev. Bot. 16; Guill. & Perr. Tent. Fl. Seneg. t. 4, as *Cocculus bakis* A.Rich.
French Sudan: Macina (Sept.). Senegal: Walo region! St. Louis (Mar.–June); Rufisque (Dec.). N. Nigeria: Katagum (Jan.)! Also in Eastern Sudan and Abyssinia. Exsicc.—*Heudelot* (no numbers). *Dalz.* 323.

5. RHIGIOCARYA Miers in Ann. Nat. Hist., Ser. 3, 14 : 100 (1864).

A glabrous climbing shrub; branchlets slender, with long internodes; leaves broadly ovate, openly cordate at the base, abruptly acutely acuminate, 7–18 cm. long, 6–16 cm. broad, thinly papery, entire, about 7-nerved at the base; petiole up to 9 cm. long, twisted at the base; male racemes axillary, simple or branched, up to 6 cm. long; infructescence up to 12 cm. long, pedicels nearly 1 cm. long; fruits ellipsoid, 1·5 cm. long, 1 cm. broad .. .. 1. *racemifera*

As above, but leaves ovate-elliptic, slightly narrowed to a rounded base, obtusely caudate-acuminate, 7–9 cm. long, 4–5 cm. broad, 3-nerved at the base; petiole up to 6 cm. long; infructescence 5–6 cm. long, pedicels 7–8 mm. long 2. *Chevalieri*

1. **Rhigiocarya racemifera** *Miers*—Diels in Engl. Pflanzenr. Menisp. 160, fig. 55; Chev. Bot. 16. *Chasmanthera ? nervosa* Miers—F.T.A. 1 : 41. *Miersiophyton nervosum* Engl. Flowers yellowish-white.
Sierra Leone: various localities! Liberia: ? locality! Ivory Coast: various localities. Gold Coast: Kumasi! Dahomey: Sakété (Jan.)! S. Nigeria Epe! Also in Cameroons. Exsicc.—*Mann* 888. *Barter* 3315. *Thomas* 8631. *Cook* 229; 287.
2. **R. Chevalieri** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *Kolobopetalum ovatum* A. Chev. Bot. 20, partly, not of Stapf. Flowers greenish-yellow; fruits red when ripe.
Ivory Coast: Soubré (May)! Taté in Tépo country (Aug.)! Lower Cavally, To (Aug.)! Gudéko (fr. May)! Exsicc.—*Chev.* 16404; 16463; 19810; 19846.

6. CHASMANTHERA Hochst.—F.T.A. 1 : 40.

Twiner; stems softly pubescent; leaves broadly ovate-rounded, widely cordate at the base, long-mucronate at the apex, up to 18 cm. long and broad, thinly papery, entire or shortly 3–7-repand-lobate, the lobes mucronate, thinly pilose on both surfaces, about 7-nerved at the base; petiole 5–10 cm. long; inflorescences very slender, drooping, axillary, pubescent, up to 20 cm. long; bracts linear, 4–5 mm. long; pedicels clustered, about 5 mm. long; flowers greenish-yellow; fruits scarlet, angular when dry, ellipsoid, about 1 cm. long .. .. *dependens*

C. dependens *Hochst.*—F.T.A. 1 : 41; Diels in Engl. Pflanzenr. Menisp. 152; Chev. Bot. 16.
Gold Coast: ? locality! Dahomey: Savalou (May); Atacora Mts. 1,350–1,650 ft. (June). N. Nigeria: Yola (June)! Nupe! S. Nigeria: Lagos Colony! Lagos (Feb., May)! Also in Cameroons and Ubangi-Shari-Chad to Abyssinia. Exsicc.—*Barter* 1728; 1731. *Farmar* 509. (See Appendix).

7. DIOSCOREOPHYLLUM Engl. Pflanzenwelt Ost-Afr. C. 81 (1895).

Leaves not or only slightly lobed:
Stems with bristly dark-rusty hairs:
Leaves rather small, about 6 cm. long, acutely acuminate; petiole about 4·5 cm. long, glabrescent; racemes about 13 cm. long; rhachis hairy in lower part 1. *fernandense*
Leaves large, lobulate, shortly acuminate, 8–15 cm. or more long; petiole 10–18 cm. long, setose-pilose; racemes 10–12 cm. long; rachis hairy .. 2. *Cumminsii*
Stems with soft scattered pale hairs; leaves ovate, toothed, acuminate, 10–13 cm. long, 5·5–7 cm. broad; racemes 6 cm. long, strigose-pilose .. .. 3. *tenerum*
Leaves deeply 3-lobed, 8–10 cm. in diam., lobes acuminate; petiole up to 7 cm. long, sparingly setose; racemes about 15 cm. long; rhachis bristly-hairy 4. *lobatum*

1. **D. fernandense** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. Climbing plant, 6 ft. long; calyx green; corolla light red.
Fernando Po (June)! Exsicc.—*Mann* 416.
2. **D. Cumminsii** *Diels* in Engl. Pflanzenr. Menisp. 181, fig. 64, a-f—Chev. Bot. 20. *D. strigosum* Engl. *Rhopalandria Cumminsii* Stapf, partly. A high climber; leaves sometimes cordate-sagittate; flowers yellow.
Sierra Leone: Limba (April)! Sendugu (June)! Pendembu (July)! Jigaya, 1,100 ft. (Nov.)! Ivory Coast: various localities. Gold Coast: Kumasi! Togo: Misahöhe (in shady forest, May). S. Nigeria: Olokemeji (July). At foot of Cameroons Mt. Exsicc.—*Cummins* 230. *Sc. Elliot* 5633. *Thomas* 683; 2429.
3. **D. tenerum** *Engl.*—Diels l.c. 181; Chev. Bot. 21. A slender twiner; leaves cordate-sagittate.
Sierra Leone: Rowalla (July)! Bumbuna (fl. and fr. Oct.)! Makump (July)! Binkolo (Aug.)! Ivory Coast: Basin of the Upper Nuon (April). Exsicc.—*Thomas* 921; 1726; 3188; 3484.
4. **D. lobatum** *Diels* l.c.—Chev. Bot. 21. *Rhopalandria lobata* C. H. Wright. A creeper with yellow flowers; seeds red, in a large bunch, "disagreeably sweet."
Ivory Coast: Middle Sassandra (May); Danané (April). Gold Coast: ? locality (fr July)! Also in Gabon. Exsicc.—*Johnson* 102. *Thomas* 1210.

8. TILIACORA Coleb.—F.T.A. 1 : 43.

Leaves rounded or subcordate at the base, ovate or broadly elliptic:
Stamens free or united only at the base:
Cymes not branched; flowers densely silky-pilose outside; leaves 16–20 cm. long, 10–12 cm. broad .. .. 1. *trichantha*
Cymes branched; flowers glabrous; leaves 4–8 cm. long, up to 6 cm. broad 2. *Warneckei*
Stamens united up to the middle, or the inner 3 up to the apex of the filament; cymes branched; leaves 8–13 cm. long, 4–6 cm. broad:
Inflorescences borne on the older leafless branches .. .. .. 3. *Lehmbachii*
Inflorescences borne on the leafy shoots .. .. 4. *Dielsiana*
Leaves cuneate at the base, elliptic or oblong-elliptic, acuminate:
Stamens 9; inflorescences on the older branchlets remote from the leaves; acumen of leaves obtuse .. .. 5. *leonensis*
Stamens 6; inflorescences on or near the leafy branchlets; acumen of leaves acute 6. *Dinklagei*

1. **T. trichantha** *Diels* in Engl. Pflanzenr. Menisp. 63. A woody climber.
Cameroons: Bare, 2,500 ft., in fringing forest (Dec.). Exsicc.—*Ledermann* 1445 (not seen).
2. **T. Warneckei** *Engl.*—Diels l.c. 64. A woody climber.
Togo: near Lome (Aug., Nov.)! Exsicc.—*Warnecke* 221. *Mildbraed* 7505.
3. **T. Lehmbachii** *Engl.*—Diels l.c. 68. A climbing shrub with rather thick branches.
Cameroons Mt.: Buea, over 3,000 ft. (Nov.)! Exsicc.—*Lehmbach* 90.
4. **T. Dielsiana** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A climber.
Sierra Leone: Kuntara (June)! Exsicc.—*Thomas* 465; 9899.

5. **Tiliacora leonensis** *Diels* l.c. 67—Chev. Bot. 17. A tall climber; leaves 10–15 cm. long, 4 cm. broad flowers yellow.
Sierra Leone: Karene (April)! Between Bumban and Falaba (April)! Gichun (April)! Kafogo (April). Ivory Coast: Guidéko to Soubré (June); Oua (April); Nzi (Aug.). Exsicc.—*Sc. Elliot* 5627; 5670.
6. **T. Dinklagei** *Engl.*—Diels l.c. 60; Chev. Bot. 17. *Glossopholis Dinklagei* Stapf 576. A low glabrous shrub or climber; leaves 10–15 cm. long, 4–5 cm. broad; flowers white or yellowish, fragrant.
Liberia: Monrovia! Grand Bassa (fl. and fr. April)! Ivory Coast: Guidéko to Soubré (June). Exsicc.—*Dinklage* 1646.

9. TRICLISIA Benth.—F.T.A. 1 : 48.

Leaves shortly cuneate at the base, ovate or ovate-elliptic, triangular-acuminate, 10–18 cm. long, 6–12 cm. broad; inflorescence laxly cymose .. 1. *patens*
Leaves rounded to cordate at the base; inflorescence crowded:
Leaves large, about 20–25 cm. long and 10–18 cm. broad, widely cordate and about 7-nerved at the base .. .. 2. *macrophylla*
Leaves smaller, less than 12 cm. long and 10 cm. broad, with fewer nerves at the base:
Leaves subcordate at the base; sepals 9 + 3 .. .. .. 3. *subcordata*
Leaves rounded or truncate at the base:
Leaves oblong-elliptic, distinctly and sharply mucronate; sepals 9 + 3 4. *Dielsii*
Leaves suborbicular, obscurely mucronate; sepals 15 + 3 .. .. 5. *coriacea*

FIG. 18.—JATRORRHIZA STRIGOSA *Miers*. (MENISPERMACEAE).
A, portion of male inflorescence.
B, bract of female flower.
C, staminal column.
D, ovary.
E, fruit.
F, longitudinal section of seed.

1. **T. patens** *Oliv.*—F.T.A. 1 : 49; Diels in Engl. Pflanzenr. Menisp. 70; Stapf 576. A climbing shrub with finely pubescent branchlets.
Senegal: locality?! French Guinea: Konakry (June)! Sierra Leone: various localities (Dec. to April)! Liberia: Kakatown! Grand Bassa (fl. May, fr. Sept.)! Exsicc.—*Mann* 797. *Farmar* 152. *Sc. Elliot* 3955; 4073; 5653. *Dinklage* 1886. *Debeaux* 424.
2. **T. macrophylla** *Oliv.*—F.T.A. 1 : 48; Diels l.c.; Chev. Bot. 19. A lofty climber; flowers green; fruits yellow in large sessile clusters.
Ivory Coast: Grabo (July). Fernando Po (Jan.)! Exsicc.—*Mann* 197.
3. **T. subcordata** *Oliv.*—F.T.A. 1 : 49; Diels l.c. 71. *Tiliacora subcordata* A. Chev. Bot. 17, name only. "A twiner; flowers green."
Dahomey: Abomey (Feb.). N. Nigeria: Nupe! S. Nigeria: Abeokuta! Lagos! Exsicc.—*Barter* 1146; 3397. *Dawodu* 223. *Chev.* 23164. (See Appendix).
4. **T. Dielsii** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A woody twiner, rusty-silky on the branches and young leaves.
Togo: near Lome! Exsicc.—*Warnecke* 327.
5. **T. coriacea** *Oliv.*—F.T.A. 1 : 49; Diels l.c. A climber, 10–15 ft.
Fernando Po! Exsicc.—*Mann* 174.

10. JATRORRHIZA Miers.—F.T.A. 1 : 41.

A climber, with stems, petioles and leaf margins clothed with stiff hairs; leaves digitately 3–5-lobed up to the middle, deeply cordate, lobes acutely acuminate, up to 20 cm. in diam., papery, reticulate, setose only on the nerves; petiole up to 20 cm. long; male flowers in lax panicles, sessile on the lateral branchlets; panicles over 30 cm. long; female flowers in simple racemes with conspicuous laciniate deciduous bracts; fruits ovoid, 2·5 cm. long, echinate.. .. .. *strigosa*

J. strigosa *Miers*—F.T.A. 1 : 42; Diels in Engl. Pflanzenr. Menisp. 167, fig. 30.
S. Nigeria: Oban! Victoria. Fernando Po (Oct., Nov., fr. Jan.)! Also in French Cameroons Gabon and Congo. Exsicc.—*T. Vogel* 37. *Mann* 193.

11. SYNTRIANDRIUM Engl. Bot. Jahrb. 26 : 412 (1899).

Leaves simple or trifoliolate, if simple lobed and openly cordate at the base ; inflorescence very long and slender, about 30 cm. long, with slightly reflexed simple branches ; flowers minute, fasciculate in the axils of the bracts .. .. 1. *Preussii*

Leaves simple, closely cordate at the base, not lobed ; inflorescence and flowers as above .. .. 2. *cordatum*

1. **S. Preussii** *Engl.*—Diels in Engl. Pflanzenr. Menisp 158, fig. 53. A glabrous climbing shrub ; male flowers greenish-yellow, soon falling off.
S. Nigeria : between Victoria and Bimbia (May) ! Exsicc.—*Preuss* 1273.

2 **S. cordatum** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. Habit of the preceding.
S. Nigeria : Calabar ! Exsicc.—*Williams* 28.

12. KOLOBOPETALUM Engl. Bot. Jahrb. 26 : 410 (1899).

Leaves cordate at the base, more or less auriculate ; lower branches of inflorescence compound :

Stamens 3 ; leaves acutely auriculate, elliptic, acutely caudate-acuminate, 5–10 cm. long, 3·5–6·5 cm. broad, often remotely repand-dentate, papery 1. *auriculatum*

Stamens 6 ; leaves obtusely auriculate, ovate, acutely long-caudate-acuminate, 10–15 cm. long, 7–9 cm. broad, remotely repand-dentate, papery 2. *Veitchianum*

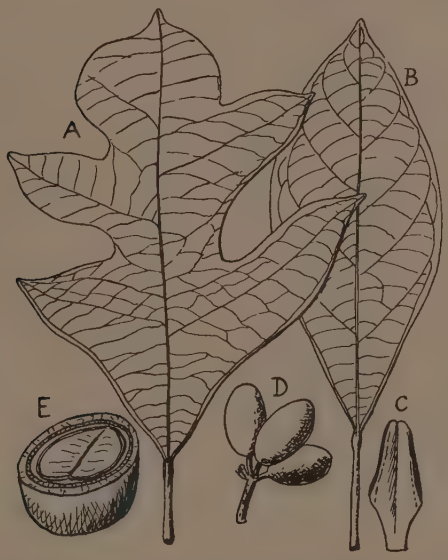

FIG. 19.—SPHENOCENTRUM JOLLYANUM *Pierre.* (MENISPERMACEAE).

A, B, leaves.

C, stamen.

D, fruit.

E, fruit in cross-section.

Leaves rounded or shortly and closely cordate at the base, not auriculate ; branches of inflorescence simple ; leaves ovate or ovate-elliptic, obtusely caudate-acuminate, 8–13 cm. long, 4–8 cm. broad, entire, papery :

Leaves not cordate at the base ; axis of inflorescence elongated, the lower lateral branches about 6 cm. long .. .. 3. *ovatum*

Leaves cordate at the base ; axis of inflorescence abbreviated, the lower branches elongated, about 20 cm. long . .. . 4. *leonense*

1. **K. auriculatum** *Engl.*—Diels in Engl. Pflanzenr. Menisp. 165, fig. 56, 57. *K. exauriculatum* H. Winkl. A lofty climber ; petioles twining ; inflorescence on the old stem.
S. Nigeria : near Victoria (April, Oct.) ! Also in French Cameroons and Gabon. Exsicc.—*Winkler* 525. *Preuss* 1118.

2. **K. Veitchianum** *Diels* l.c. 164. Like the preceding ; flowers dirty yellow.
S. Nigeria : Victoria (Jan.) ! Also in French Cameroons. Exsicc.—*Kalbreyer* 19.

3. **K. ovatum** *Stapf* 576—Diels l.c. ; Chev. Bot. 20, partly. A glabrous climbing shrub.
Liberia : Fishtown (May) ; Sino Basin ! Ivory Coast : Mid. Sassandra, Soubré (June) ! Upper Sassandra, between Man and Zagoué (May) ! Togo : Misahöhe (April). Dahomey : Porto Novo district (Jan.–Feb.). Exsicc.—*Whyte. Chev.* 19140 ; 21551.

4. **K. leonense** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A climbing shrub ; petioles twining.
Sierra Leone : ? locality ! Exsicc.—*Thomas* 3858.

13. SPHENOCENTRUM Pierre in Bull. Soc. Linn. Par., n.s. 1 : 79 (1898).

Erect shrub, up to 3 ft. high ; branchlets glabrous ; leaves variable on the same shoot, obovate-elliptic and entire or pinnately lobed, both apex and lobes acuminate,

12–20 cm. long, 5–12 cm. broad, glabrous ; lateral nerves about 6, the basal pair lining the margin ; petiole sulcate, 2–7 cm. long, conspicuously bent and thickened at the apex, tumid at the base ; flowers in axillary bunches, yellowish-white ; fruit ovoid-ellipsoid, about 2 cm. long, up to 1·5 cm. broad, puberulous. .. .. *Jollyanum*

Sphenocentrum Jollyanum *Pierre*—Diels in Engl. Pflanzenr. Menisp. 99, fig. 36 ; Chev. Bot. 20. "Fruit borne close to the soil, orange-coloured, resembling in taste and structure a small mango" (Barter).
Ivory Coast : Dabou (fr. and male fl. May) ! Guidéko, etc. (Jan., May, June) ; Bouroukrou (Dec.–Jan.). Dahomey : Porto Novo (Jan.) ; Sakété (Jan.) ; Allada (Feb.). S. Nigeria : Annye (fr. Sept.) ! Epe ! Exsicc.—*Jolly* 132. *Barter* 3290. (See Appendix).

14. PENIANTHUS Miers—F.T.A. 1 : 50.

Lateral nerves raised on the upper surface ; flowers not known ; fruits narrowly ellipsoid, 3·5 cm. long, 1–1·5 cm. broad, glabrous and shining, red .. 1. *patulinervis*
Lateral nerves impressed on the upper surface :
Leaves elliptic, rounded to an obtuse base ; lateral nerves 6–8 .. 2. *fruticosus*
Leaves obovate, narrowed from above the middle to the base ; lateral nerves about 10 .. .. 3. *longifolius*

FIG. 20. — CISSAMPELOS OWARIENSIS *P. Beauv.* (MENISPERMACEAE).
A, portion of female inflorescence.
B, ovary.
C, male flower.
D, seed.
E, seed in longitudinal section.

1. **P. patulinervis** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *P. longifolius* A. Chev. Bot. 19, not of Miers. *P. Zenkeri* A. Chev. l.c., not of Diels. A small tree or shrub.
Sierra Leone : Kememe (fr. Jan.) ! Ivory Coast : various localities ! Gold Coast : Kumasi (fr. Jan.) ! Exsicc.—*Cummins* 169 ; 190. *Thomas* 7650a. *Chev.* 15436 ; 15507 bis ; 17843. (See Appendix).
2. **P. fruticosus** *Hutch. & J. M. Dalz.* l.c. *P. longifolius* Diels in Engl. Pflanzenr. Menisp. 101, partly, not of Miers. A small shrub, 3–4 ft. high.
Cameroons Mt., 500 ft. (Jan.) ! Exsicc.—*Mann* 1205.
3. **P. longifolius** *Miers*—Diels l.c., partly. A shrub, 12–15 ft. high ; flowers brown-red ; fruit red.
Fernando Po (Jan.) ! Exsicc.—*Mann* 194.

15. STEPHANIA Lour.—F.T.A. 1 : 46.

Inflorescences borne in the axils of the leaves :
Inflorescence elongated, up to 30 cm. long ; leaves 11–13 cm. long, about 10 cm. broad, crenate .. .. 1. *laetificata*
Inflorescence 4–6 cm. long ; leaves usually up to about 8 cm. long, entire 2. *abyssinica*
Inflorescences borne on the old leafless branches, up to 20 cm. long ; leaves broadly ovate, 7–13 cm. long, about 7–11 cm. broad, entire ; petiole 8–12 cm. long 3. *Dinklagei*

1. **S. laetificata** *Oliv.*—F.T.A. 1 : 47 ; Diels in Engl. Pflanzenr. Menisp. 262, fig. 87. A climbing plant, 30 ft. long ; calyx green ; corolla white.
S. Nigeria : Oban ! Victoria (Jan.). Cameroons Mt. : Buea (Mar.–May). Fernando Po (Jan.) ! Extends south to Angola. Exsicc.—*Mann* 236.
2. **S. abyssinica** *Walp.*—F.T.A. 1 : 47 ; Diels l.c. 268 ; Chev. Bot. 18. A climbing plant, 6–30 ft. high ; calyx and corolla green.
French Guinea : Labé (April) ! Labedeperré (April). Fernando Po, 3,000–5,000 ft. (Dec.) ! Cameroons Mt., 7,000 ft. (Feb. and Dec.) ! Widely spread in tropical Africa. Exsicc.—*Mann* 629 ; 1242 ; 2169. (See Appendix).

3. **Stephania Dinklagei** *Diels* l.c. 265—Chev. Bot. 18. *Cissampelos Dinklagei* Engl. A climbing shrub, 45–60 ft.; flowers greenish.
Forest Guinea: Kindia (Mar.). Sierra Leone: R. Searcies, near Tassin (Jan.)! Kamalu (May)! Ivory Coast: Bouroukrou (Dec.–Jan.); Diambarakrou (Mar.). Togo: Misahöhe (fr. April). S. Nigeria: Ikorodu (Mar.). Lagos! Cameroons Mt.: Buea, 4,600 ft. (April–June). Also in French Cameroons. Exsicc.—*Sc. Elliot* 4495. *Thomas* 324. (See Appendix).

16. CISSAMPELOS Linn.—F.T.A. 1 : 45.

Leaves peltate, suborbicular, usually repand-lobate, lobes mucronate, thin, thinly pubescent or glabrescent below, 5–11 cm. broad; male inflorescence elongate, very slender, female with large membranous bracts .. .. .. 1. *owariensis*
Leaves not or only slightly peltate, entire, thickly papery, softly tomentose below, up to 8 cm. broad; male inflorescence short, corymbose, the female with small leafy bracts .. .. 2. *mucronata*

1. **C. owariensis** *P. Beauv.*—F.T.A. 1 : 46, and Holl. 1 : 52, as var. of *C. Pareira* Linn.; Diels in Engl. Pflanzenr. Menisp. 302; Chev. Bot. 18. A twiner, the ♀ with greenish-white bracts.
Coast districts from Gold Coast to Cameroons. Also in other parts of tropical Africa. (See Appendix).
2. **C. mucronata** *A. Rich.*—Diels l.c. 300; Chev. Bot. 18 (also as *C. Pariera* Linn., Chev. l.c. 19). A twiner over shrubs, with greenish flowers; fruit red; root thickened.
Drier regions throughout the area, and in other parts of Africa. (See Appendix).

12. ARISTOLOCHIACEAE

Climbing shrubs, or rarely dwarf and erect; stems of the woody species in cross-section showing broad medullary rays; roots often medicinal. Leaves petiolate, alternate, exstipulate, simple, mostly entire. Flowers solitary or racemose, axillary or in clusters on the older wood, pedicellate, hermaphrodite, zygomorphic or rarely actinomorphic. Perianth single, often enlarged and petaloid, variously produced above the ovary, often tubular, the limb either symmetrically 3-lobed, or unilateral and entire or lobed, usually highly coloured and foetid. Stamens 6–∞, in 1–2 series around the apex of the ovary or stylar column; filaments short, thick, free or scarcely distinguishable from the column; anthers free or adnate, with 2 parallel cells, extrorse, opening longitudinally. Ovary inferior or rarely semi-superior, 4–6-celled or imperfectly celled; styles thick, short, united into a column, divided into 3–8 stigmatic lobes; ovules numerous in each cell. Fruit capsular or rarely indehiscent, sometimes dehiscing from the base upwards and hanging like an inverted parachute. Seeds numerous, often immersed in the pulpy endocarp, 3-sided or flattened, raphe sometimes thickened or winged; endosperm copious, fleshy; embryo small.

Generally distributed throughout the tropics and warm temperate regions, with a few species in the cooler parts of the North Temperate Zone especially. Easily recognised by the structure of the wood, the usually climbing habit, the hermaphrodite flowers with often (*Aristolochia*) enlarged and petaloid single perianth, and usually capsular fruit with triquetrous or flattened seeds.

Perianth-limb regular, 3-lobed; fruit (where known) elongated, indehiscent, strongly ribbed .. .. 1. **Pararistolochia**
Perianth-limb irregular, often oblique, entire or unilaterally 1–3-lobed or -tailed; fruit mostly short and dehiscent .. .. 2. **Aristolochia**

1. PARARISTOLOCHIA Hutch. & J. M. Dalz. in Kew Bull. 1927, ined.

Perianth-lobes with intermediate very small lobes; leaves not known 1. *ju-ju*
Perianth without intermediate lobes:
Leaves not lobed, rounded or very slightly cordate at the base, ovate to elliptic; perianth-tube up to 5 cm. long:
Leaves narrowed to the acuminate apex, 8–11 cm. long, 4–7 cm. broad, very laxly veined; flowers on the leafy shoots, small, the tube about 2 cm. long, only slightly pouched at the base, the limb shortly lobed, the lobes hardly 1 cm. long, almost forming a triangle .. .. 2. *leonensis*
Leaves about 15 cm. long, 9 cm. broad; flowers on the older wood, larger, the tube about 4 cm. long, slightly pouched at the base, the limb deeply divided into 3 subequal lanceolate lobes about 4 cm. long, tapering to a fine point 3. *tribrachiata*
Leaves acuminate, 7–13 cm. long, up to 8 cm. broad, rather closely reticulate; flowers on the older wood, large, the tube about 7 cm. long, conspicuously pouched at the base, the limb deeply divided into 3 ovate-lanceolate acute lobes 5–8 cm. long .. .. 4. *Flos-avis*

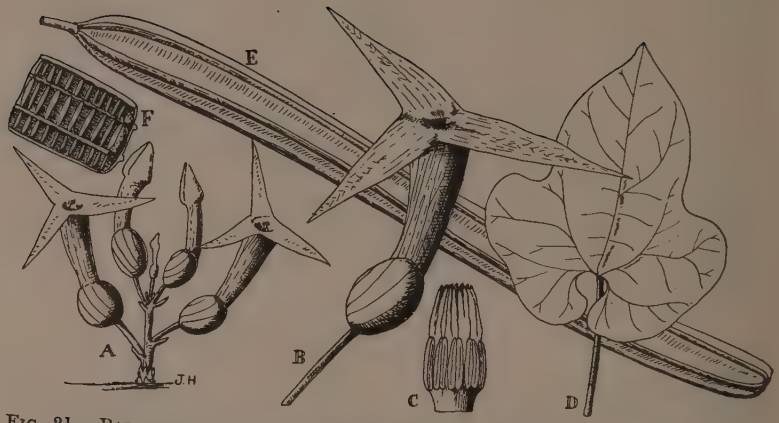

FIG. 21.—PARARISTOLOCHIA TRIACTINA *Hutch. & J. M. Dalz.* (ARISTOLOCHIACEAE). A, inflorescence. B, flower. C, anthers and stigmas. D, leaf. E, fruit. F, longitudinal section of portion of fruit.

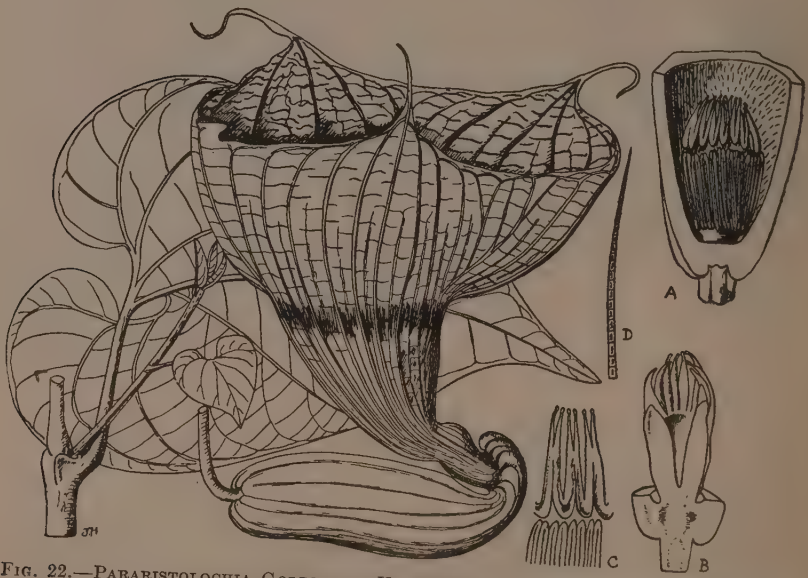

FIG. 22.—PARARISTOLOCHIA GOLDIEANA *Hutch. & J. M. Dalz.* (ARISTOLOCHIACEAE). A, lower portion of perianth with side cut away to show stamens and stigmatic lobes. B, vertical section of stylar column with stigmatic lobes. C, anthers and stigmatic lobes. D, hair from within the lower part of the perianth.

Leaves shallowly trilobed, deeply cordate-auriculate at the base ; perianth-tube about 8 cm. long, with large pouch at the base ; fruit indehiscent, elongate, about 25 cm. long, 6-ribbed .. .. *5. triactina*

Leaves not lobed, deeply cordate at the base, broadly rounded-ovate, abruptly acuminate, up to about 15 cm. long and broad ; perianth-limb very large and spreading, with 3 linear tails, basal portion of tube about 18 cm. long and 4–5 cm. wide, with reddish-purple ribs .. .. 6. *Goldieana*

1. **Pararistolochia ju-ju** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *Aristolochia ju-ju* S. Moore in Journ. Bot. 1920: 269. A twiner ; bark rugose with lenticels ; flowers rather large, inflated part of perianth 3 cm. long, 2–2·5 cm. broad, tube 7 cm. long.
S. Nigeria : Degema ! Exsicc.—*Talb.* 3766.

2. **P. leonensis** *Hutch. & J. M. Dalz.* l.c. *Aristolochia leonensis* Mast. in Journ. Linn. Soc. 30 : 95 (1894). A strong twiner, often with warty bark ; flowers comparatively small ; petioles of leaves twisted and twining.
Sierra Leone : near Kassa (Mar.) 3,600 ft. ! Falaba (Mar.) ! Exsicc.—*Sc. Elliot* 5401 ; 5062.

3. **P. tribrachiata** *Hutch. & J. M. Dalz.* l.c. *Aristolochia tribrachiata* S. Moore in Cat. Talb. Nig. Pl. 92. Stem twining, stout, fissured ; inflorescence with a thick woody base ; flowers yellowish-white, lobes reddish-purple with white streaks.
S. Nigeria : Oban ! Exsicc.—*Talb.* 213 ; 1542.

4. **P. Flos-avis** *Hutch. & J. M. Dalz.* l.c. *Aristolochia Flos-avis* A. Chev. in Journ. de Bot. 1909 : 129 ; Bot. 539. *A. Tessmannii* Engl. Bot. Jahrb. 46 : 413 (1911). A stout woody twiner with rough channelled bark and twining petioles ; flowers greenish to yellowish-white outside with very numerous purple spots.
Sierra Leone : Commendi-Gengaru Road (Nov.) ! Ivory Coast : Guidéko (May) ; between Sampleu and Ganhoué (April) ! S. Nigeria : Oban ! Also in French Cameroons and Spanish Guinea. Exsicc.—*Chev.* 21145.

5. **P. triactina** *Hutch. & J. M. Dalz.* l.c. *Aristolochia triactina* Hook. f.—F.T.A. 6, 1 : 140. A woody climber. 25 ft. or more long, with pendulous cucumber-like fruits ; perianth-lobes red-purple, tube paler.
S. Nigeria : Lagos (Mar.) ! Itu (Mar.) ! Also in Spanish Gabon and Angola. Exsicc.—*Holl.* 26. *Moloney* 18. *Dalz.* 1076.

6. **P. Goldieana** *Hutch. & J. M. Dalz.* l.c. *Aristolochia Goldieana* Hook. f.—F.T.A. 6, 1 : 142 ; Bot. Mag. t. 5672 ; Holl. 4 : 552. A glabrous climber, 20 ft. long, with very large flowers ; fruits several inches long, with six well-marked ridges.
Sierra Leone : Port Lokko (April) ! Pendembu ! N. Nigeria : forests near Lokoja ! S. Nigeria : Elugu ! Lagos ! Oban ! Fernando Po ! Also in Cameroons. Exsicc.—*Talb.* 2338 ; 2339 ; 2340 ; 2341. *Barter* 3427. *Sc. Elliot* 5682 ; 5747. *Mann* 391. (See Appendix).

2. ARISTOLOCHIA L.—F.T.A. 6, 1 : 135.

Perianth subregular, with a somewhat oblique limb divided into 3 short slightly unequal rounded lobes ; leaves 3–5-lobed, closely and deeply cordate at the base, auricles sometimes overlapping, glabrous ; pedicels glabrous ; perianth-limb unequally lobed .. .. 1. *Mannii*

Perianth irregular, with an oblique one-sided limb :

Flowers subtended by a leafy bract ; fruit oblong-ovoid, dehiscing from the base, valves breaking away from the persistent ribs :

Perennial herb, stems flexuous ; flowers solitary in the leaf axils ; older leaves not very reticulate ; fruits about 2·5 cm. long .. .. .. 2. *bracteata*

Shrubby climber ; stems twining ; flowers racemose ; older leaves markedly reticulate ; fruits about 5–6 cm. long .. .. 3. *albida*

Flowers with very small and not leafy bracts ; fruits mostly not known :

Perianth gradually tapered into the long tails :

Leaves chartaceous, very shortly acuminate (acumen about 4 mm. long) ; flowers usually on the leafy shoots .. .. 4. *flagellata*

Leaves submembranous, long-acuminate (acumen over 1 cm. long) ; flowers on the old wood .. .. 5. *promissa*

Perianth more or less abruptly narrowed into the long tails ; leaves not known :

Perianth-tube 4·5–5 cm. long, about 1 cm. wide in the middle when flattened out ; flowers borne in clusters on the older leafless branchlets ; pedicels about 3 cm. long .. .. 6. *Talbotii*

Perianth-tube 8 cm. long, about 1·5 cm. broad in the middle when flattened out ; tails thread-like, about 15 cm. long .. .. 7. *tenuicauda*

Besides the above, other species have been introduced into gardens, and may have become naturalised. We have seen three such species : *A. ridicula* N.E. Br. and *A. elegans* Mast., natives of Brazil, grown in the Aburi Botanic Gardens, Gold Coast, and the latter also from the neighbourhood of Brass, S. Nigeria ; and *A. gibbosa* Duchartre, a native of Mexico, also from Aburi.

1. **A. Mannii** *Hook f.*—F.T.A. 6, 1 : 140. A woody climber, 10–15 ft. long ; flowers dark-violet with yellowish spots ; fruit with 8 ridges.
S. Nigeria : Old Calabar River (Feb.) ! Bonny (Feb.) ! Exsicc.—*Mann* 2323. *Thomson* 69. *Kalbreyer* 62.

2. **A. bracteata** *Retz.*—F.T.A. 6, 1 : 136 ; Holl. 4 : 552 ; Chev. Bot. 539. A small glabrous shrub, stems flexuous from a woody base ; flowers yellow-brown with a purple lip.
French Sudan : Lake Tacadji (Aug.) ! N. Nigeria : Bornu (Feb.) ! Also in Eastern Sudan, S. Arabia and India. Exsicc.—*E. Vogel* 45. *Chev.* 3460. (See Appendix).

3. **A. albida** *Duchartre*—F.T.A. 6, 1 : 137 ; Holl. 4 : 551. *A. Ledermannii* Engl. Stems glabrous, twining on other plants ; flowers black-purple.
Senegal : Bondou. N. Nigeria : Katagum ! Nupe ! Lagos ! Also in Angola. Exsicc.—*Barter* 1531. (See Appendix).

4. **A. flagellata** *Stapf*—F.T.A. 6, 1 : 141. Climber, evergreen ; flowers handsome, yellowish with purplish blotches.
Gold Coast : Aburi (Oct.–Nov.) ! Exsicc.—*Johnson* 1060.

5. **Aristolochia promissa** *Mast.*—F.T.A. 6, 1 : 142. Woody climber, 20–25 ft. long; flowers dirty yellow, brown-spotted, appearing 2 or 3 months before the leaves "on the old stem freely almost from the ground to the top." S. Nigeria: Victoria (Jan.)! Barombi (Mar.)! Exsicc.—*Kalbreyer* 7. *Preuss* 45.
6. **A. Talbotii** *S. Moore* in Cat. Talb. Nig. Pl. 93, t. 11, f. 7. "Perianth pale yellowish-green"; tails about 10 cm. long.
S. Nigeria: Oban! Exsicc.—*Talb.* 128; 2310.
Var. **longissima** *S. Moore* l.c. Tails of perianth about 25 cm. long.
S. Nigeria: Oban! Exsicc.—*Talb.* 1642.
7. **A. tenuicauda** *S. Moore* l.c. 94.
S. Nigeria: Oban! Exsicc.—*Talb.* 2318.

13. PIPERACEAE

Herbs or shrubs, erect or scandent; vascular bundles more or less scattered, as in *Monocotyledones*. Leaves usually alternate, entire, rarely opposite or whorled, petiolate, stipules adnate to the petiole or absent. Flowers minute, hermaphrodite or unisexual, usually densely spicate or spikes umbellate. Perianth absent. Stamens 2–6, hypogynous; filaments usually free; anthers 2-celled, distinct or confluent. Ovary superior, 1-celled, 1-ovuled; stigmas 1–5, short; ovule erect. Fruit baccate, small, with a succulent, thin or dry pericarp. Seeds small, with small endosperm and copious mealy perisperm; embryo very small.

Throughout the warmer regions of the world, comparatively rare in Africa, very abundant in tropical America. Readily recognised by the structure of the stem, the minute spicate flowers entirely devoid of perianth, the definite number of stamens, the 1-celled and 1-ovuled ovary, the baccate fruit, and minute embryo of the seed.

Herbs; stamens 2, with confluent anther-cells; stigma single, sessile, penicillate or undivided; stipules absent; leaves sometimes opposite or whorled 1. **Peperomia**
Shrubs; stamens 2–6, usually with distinct anther-cells; stigmas 2–5; stipules adnate to the petiole; leaves alternate .. .. 2. **Piper**

1. PEPEROMIA Ruiz & Pav.—F.T.A. 6, 1 : 147.

Leaves alternate:
Flowers hermaphrodite:
Lateral inflorescences leaf-opposed or inflorescence terminal:
Leaves cordate or rounded-cordate at the base, with 5–7 nerves, very thin; inflorescence very slender, with scattered flowers .. .. .. 1. *pellucida*
Leaves rounded or cuneate at the base, 3–5-nerved, moderately firm or rather thick:
Leaves rounded and 5-nerved at the base; plant not very fleshy; spikes slender 2. *Zenkeri*
Leaves cuneate and 3-nerved at the base; plant fleshy, the stems becoming almost angular when dry; spikes rather stout .. .. .. 3. *vulcanica*
Lateral inflorescences axillary:
Leaves acuminate, more or less ovate:
Leaves acutely rather long-acuminate, about 4–6 cm. long, up to 3 cm. broad; spikes fairly stout:
Leaves gradually and rather broadly acuminate; (Cameroons) 4. *Preussii*
Leaves rather abruptly and narrowly acuminate; (Fernando Po) 5. *fernandopoiana*
Leaves shortly and rather obtusely acuminate, 3·5 cm. long, up to 2 cm. broad; spikes very slender .. .. 6. *Staudtii*
Leaves rounded or notched at the apex:
Leaves obovate, notched at the apex, 2–3·5 cm. long, 1–1·5 cm. broad 7. *vacciniifolia*
Leaves elliptic to orbicular, not emarginate:
Leaves elliptic to ovate-orbicular, longer than broad, 1–2 cm. long, up to 1·5 cm. broad, rather thin .. .. 8. *Mannii*
Leaves orbicular, under 1 cm. broad, rather thick .. .. 9. *bagroana*
Flowers monoecious; spikes terminal, as long as the leaves; leaves ovate-elliptic, acute at the base, obtusely subacuminate, 3-nerved, up to 2 cm. long and 1 cm. broad, the lower leaves smaller and rounded .. .. .. 10. *bueana*
Leaves opposite or whorled; spikes axillary or terminal:
Stems and leaves densely pubescent; leaves in pairs, elliptic-obovate, up to 2 cm. long and over 1 cm. broad, distinctly petiolate .. .. .. 11. *kamerunana*
Stems and leaves densely pubescent; leaves in threes, obovate-cuneate, up to 1 cm. long and 0·5 cm. broad; petiole 2 mm. long .. .. .. 12. *Dusenii*
Stems and leaves glabrous; branching dichotomous; leaves in fours, broadly obovate-elliptic, about 1·5 cm. long, shortly petiolate .. .. .. 13. *reflexa*

1. **Peperomia pellucida** *H. B. & K.*—F.T.A. 6, 1 : 149 ; Holl. 4 : 558 ; Chev. Bot. 541. A herb, usually erect, with delicate leaves.
Senegal ! French Guinea : Farana (Feb.). Sierra Leone : various localities ! Ivory Coast : Upper Sassandra (May). N. Nigeria : Lokoja (Sept., Dec.) ! S. Nigeria : Lagos ! Cosmopolitan in the tropics. Exsicc.—*T. Vogel* 192. *Sc. Elliot* 3885. (See Appendix).
2. **P. Zenkeri** *C.DC.* in Engl. Bot. Jahrb. 19 : 226. *P. Baumannii* C.DC. A herb, like the preceding.
Gold Coast : Obosomase (Aug.) ! Togo : Misahöhe (July) ! Cameroons Mt. : Buea, 3,000 ft. (Oct.) ! Also in French Cameroons, St. Thomas Island and Angola. Exsicc.—*Preuss* 1060.
3. **P. vulcanica** *Baker & C. H. Wright.*—F.T.A. 6, 1 : 151. A rather fleshy herb ; stems rooting at the base.
Cameroons Mt., 8,000 ft. (Jan.) ! Exsicc.—*Mann* 1305.

FIG. 23.—PIPER UMBELLATUM *Linn.* (PIPERACEAE).

A, base of petiole. B, ovary. C, portion of spike showing flowers and bracts. D, portion of spike. E, bract.

4. **P. Preussii** *C.DC.*—F.T.A. 6, 1 : 150. Herb, stems rooting at the base.
S. Nigeria : Oban ! Cameroons Mt. : Buea, 4,000 ft. ! Also in French Cameroons. Exsicc.—*Deistel* 587. *Talb.* 2324 ; 2324A.
5. **P. fernandopoiana** *C.DC.*—F.T.A. 6, 1 : 152 ; Chev. Bot. 541. Perennial, stems trailing and rooting.
French Guinea, 3,000–4,000 ft. (Jan.–April). Ivory Coast, 2,000 ft. (April, May). Fernando Po, 1,300 ft. (April) ! Also in French Cameroons. Exsicc.—*Mann* 394.
6. **P. Staudtii** *Engl.* Bot. Jahrb. 26 : 361. Stems several from a perennial rhizome, little branched ; in moist places on rocks and trees.
S. Nigeria : Oban ! Also in French Cameroons. Exsicc.—*Talb.* 2324.
7. **P. vacciniifolia** *C.DC.*—F.T.A. 6, 1 : 152. Stems trailing and rooting below.
Cameroons Mt. : Buea, 5,000–6,000 ft. ! Exsicc.—*Preuss* 875*a*.

8. **Peperomia Mannii** *Hook. f.*—F.T.A. 6, 1 : 153. Herb, annual, stems creeping and rooting at the base. Cameroons Mt., 7,000 ft.! Fernando Po, 1,600 ft.! Also in French Cameroons and Central Africa. Exsicc.—*Mann* 291 ; 2016.
9. **P. bagroana** *C.DC.*—F.T.A. 6, 1 : 154 ; Chev. Bot. 540. Annual, with a filiform creeping stem. Sierra Leone : Bagroo River (April)! Ivory Coast : Fort Hittos (April). Gold Coast : Kibbi (Dec.)! Also in Uganda. Exsicc.—*Mann* 905.
10. **P. bueana** *C.DC.*—F.T.A. 6, 1 : 153. *P. hygrophila* Engl. ? Stems trailing, rooting at the nodes. Cameroons Mt. : near Buea! Fako Plateau, 8,000 ft. (June)! Exsicc.—*Preuss* 663.
11. **P. kamerunana** *C.DC.*—F.T.A. 6, 1 : 154. Stem decumbent, fairly stout. Cameroons! Exsicc.—*Preuss* 918.
12. **P. Dusenii** *C.DC.*—F.T.A. 6, 1 : 155. Stem branched, rooting at the base. Cameroons. Exsicc.—*Dusen* 436.
13. **P. reflexa** *A. Dietr.*—F.T.A. 6, 1 : 155 ; Chev. Bot. 541. Stems tufted, creeping. French Guinea : Diaguissa, (April) ; Dalaba, 3,000–4,000 ft. (April, Dec.)! Cameroons Mt., 7,000 ft. on trees (Jan.)! Extends to Socotra and Rhodesia. Exsicc.—*Chev.* 20288. *Dunlap* 5 ; 223.

2. PIPER Linn.—F.T.A. 6, 1: 144.

Inflorescence solitary, leaf-opposed or terminal ; leaflets rounded or slightly cordate at the base :
Fruits spicate ; peduncle as long as or longer than the flowering axis ; stigmas 2 ; leaf-base 7-nerved .. .. 1. *capense*
Fruits racemose ; pedicels up to 5 mm. long ; peduncle usually shorter than the flowering axis ; stigmas 3 ; leaf-base at most 5-nerved .. 2. *guineense*
Inflorescences from 2 to several in a pedunculate axillary umbel ; peduncle shorter than the flowering axis ; stigmas 3 ; leaves deeply cordate and many-nerved at the base 3. *umbellatum*

The following species are cultivated in gardens: *P. Betle* Linn., *P. Cubeba* Linn. f., *P. nigrum* Linn. (Holl. 4. : 552).

1. **P. capense** *Linn. f.*—F.T.A. 6, 1 : 146, incl. var. *magnifolium* C.DC. *P. bisexuale* C. DC. A shrub, erect or more or less climbing. Cameroons Mt., 7,000–8,000 ft. (Dec.), Buea! Fernando Po, 1,300 ft.! Also in French Cameroons, and in East and South Africa. Exsicc.—*Mann* 299 ; 2015. *Preuss* 615. The specimens in our area have mostly glabrescent leaves, and the peduncles are often longer than the flowering axis ; the reverse is the case in the South African material.
2. **P. guineense** *Schum. & Thonn.*—F.T.A. 6, 1 : 145 ; Holl. 4 : 554 ; Chev. Bot. 540. *P. Famechonii* C.DC. A climber, 30–40 ft. long, on trees ; fruit red or red-brown when ripe, black when dry. French Guinea : Kissidougou (Feb.) ; Toma (Feb.). Sierra Leone : various localities (Feb., Oct.)! Ivory Coast : various localities. Gold Coast : E. Akim (Mar., June)! Begoro, 1,500 ft. (Mar.)! Akwapim (June)! N. Nigeria : Nupe! Agaie (Sept.)! S. Nigeria : Lagos (Mar.)! Ibadan (July) ; Brass! Fernando Po (Jan., June, Nov.)! Also in French Cameroons to Angola and Uganda. Exsicc.—*Sc. Elliot* 4003 ; 4688. *Barter* 2076. *T. Vogel* 97. *Mann* 162. (See Appendix).
3. **P. umbellatum** *Linn.*—F.T.A. 6, 1 : 144 ; Holl. 4 : 558 ; Chev. Bot. 540, incl. var. *subpeltatum* C.DC. A shrub, 4–6 ft., with white narrow catkins, in moist shady places. French Guinea : Futa Jallon, 3,000–4,000 ft. (Oct.) ; Kouria (Nov.). Sierra Leone : various localities; 1,100 ft.! Liberia : Sinoe Basin! Ivory Coast : various localities. Gold Coast : Ashanti, Kumasi! W. Apollonia (Aug.)! N. Nigeria : Lokoja (Feb.)! S. Nigeria : Lagos (Mar.)! Aguku! Oban! Cameroons Mt., 3,000 ft. (Feb.)! Fernando Po (Nov., Dec.)! Cosmopolitan tropical. Exsicc.—*Sc. Elliot* 4077 ; 4287. *T. Vogel* 53. *Mann* 70 ; 1272. (See Appendix).

14. PAPAVERACEAE

Annual, biennial or perennial herbs with coloured juice, often glaucescent and prickly, or rarely shrubs or small trees ; root usually a rhizome or tuber. Leaves exstipulate, alternate, rarely the floral leaves opposite or whorled, much divided, rarely entire. Flowers hermaphrodite, actinomorphic, hypogynous or rarely perigynous, mostly solitary, fugacious and visited by pollen-eating insects. Perianth of calyx and corolla, or rarely the latter absent. Sepals 2, rarely 3, green, falling off separately on the opening of the flower or united into a deciduous calyptra. Petals showy, 4 or 6, rarely 8 or 12, free, imbricate and often crumpled in the bud, deciduous. Stamens numerous, rarely few, free, with filiform filaments ; anthers mostly nearly as long as the filaments, 2-celled, dehiscing by longitudinal slits. Ovary free, of 2 or more united carpels, 1-celled with parietal placentas, or several-celled by the placentas reaching to the middle. Ovules numerous, rarely solitary. Fruit a capsule, opening by valves or pores. Seeds small, with minute embryo in fleshy or oily endosperm.

Mainly natives of the North Temperate Zone, rare in the tropics ; represented in our area by a single introduced species.

ARGEMONE Linn.—F.T.A. 1 : 54.

Sepals 2–3. Petals 4–6, yellow. Stamens numerous. Ovary with 4–7 placentas; stigmas radiating. Capsule opening by valves at the top. Seeds pitted.

A. mexicana *Linn.*—F.T.A. 1 : 54 ; Holl. 1 : 53 ; Chev. Bot. 22. A prickly glaucous erect herb, with yellow juice ; leaves semi-amplexicaul, pinnately lobed ; flowers bright yellow ; capsule smooth or setose, 3–4 cm. long ; seeds pitted-reticulate.
Mexican Poppy, introduced from America and found in waste dry places and roadsides throughout the area and in other parts of Africa. (See Appendix).

15. TURNERACEAE

Herbs or undershrubs with entire or lobed alternate leaves; stipules absent. Flowers hermaphrodite, actinomorphic, yellowish. Calyx tubular, 5-toothed, teeth imbricate. Petals 5, inserted on the calyx-tube, free, clawed, contorted. Stamens 5, from the base of the calyx-tube; filaments free; anthers 2-celled, opening lengthwise. Ovary superior, 1-celled with 3 parietal placentas; styles 3, terminal, slender; stigmas fringed; ovules numerous. Fruit a capsule, opening loculicidally by 3 valves with the placenta in the middle of each. Seeds arillate, pitted; endosperm horny or fleshy; embryo straight, large.

Tropics and subtropics. Mostly herbaceous and resembling *Cruciferae* or *Capparidaceae*. Recognised by the tubular calyx and 1-celled ovary with parietal placentas.

FIG. 24. — WORMSKIOLDIA PILOSA *Schweinf.* (TURNERACEAE).

A, leaves.
B, fruit.
C, seed.

WORMSKIOLDIA Schum. & Thonn.—F.T.A. 2 : 501.

Herbs. Calyx tubular, 5-toothed. Petals 5, clawed, with a scale at their base. Stamens 5, arising from the base of the calyx-tube. Ovary 1-celled; styles 3, slender; stigmas fringed. Capsule linear, opening loculicidally by 3 valves with the placenta in the middle of each; seeds conspicuously pitted.

A branched herb about 1 ft. high; stems finely pubescent and with numerous purple bristles; leaves linear or linear-lanceolate, entire, denticulate or pinnatilobed, up to 18 cm. long and 1 cm. broad, glabrous or shortly bristly below; flowers yellow, much resembling a Crucifer, racemose; calyx long-tubular, narrow, 1 cm. long, shortly 5-lobed, more or less bristly outside; petals exceeding the calyx; pod slender, slightly torulose, about 5 cm. long, shortly stipitate, beaked; seeds about 20, about 3 mm. long, straw-coloured, conspicuously pitted .. .. *pilosa*

W. pilosa *Schweinf.* ex *Urb.* in Jahrb. Kgl. Bot. Gart. Berlin, 2 : 54 (1883). *W. heterophylla* Schum. & Thonn. —Guill. & Perr. Tent. Fl. Seneg. t. 11; F.T.A. 2 : 502; Chev. Bot. 283.

French Sudan: Gourma (July)! Senegal! Dahomey: Savalou (May). N. Nigeria: Nupe! Lokoja (Sept.)! Zungeru (Aug.)! Ufaka (June)! Liruwen-Kano Hills! Also in Eastern Sudan and Uganda. Exsicc.—*T. Vogel* 188. *Barter* 1552. *Dalz.* 93; 559.

16. CAPPARIDACEAE

Herbs, shrubs or trees, sometimes scandent. Leaves alternate or rarely opposite, simple or digitately 3–7-foliolate; stipules when present minute or spiny. Flowers mostly hermaphrodite, actinomorphic or rarely zygomorphic, hypogynous, axillary or terminal, variously arranged. Perianth of calyx and corolla, or the latter absent. Sepals free or partially united, imbricate or valvate, usually 4. Petals 4 to many or absent. Torus elongated or short, rarely with an appendix. Stamens few to many, sometimes some of them without anthers; filaments sometimes partially adnate to the torus; anthers 2-celled, longitudinally dehiscent. Ovary sessile or more usually supported on a long or short gynophore, 1-celled with parietal placentas or divided into 2 or more cells by spurious dissepiments; ovules few to many. Fruit a capsule or berry, sometimes the latter elongate or torulose. Seeds usually reniform or angular; endosperm none or scanty; embryo arcuate or incurved.

Tropics and subtropics of both hemispheres, very numerous in East Africa and South America. Recognised by the usually showy flowers, clawed petals, mostly stipitate ovary, parietal placentas and curved embryo with scanty or no endosperm.

Fruit a capsule, splitting its full length into two valves; mostly herbaceous annuals:
  Torus short, not adnate to the free filaments; stamens 4 to many .. 1. **Cleome**
  Torus elongated into a gynophore bearing the filaments; stamens usually 6 2. **Gynandropsis**
Fruit a berry or drupe, often torulose; shrubs or trees or rarely suffrutescent with woody rhizomes and annual shoots:
  Petals present:
    Sepals connate into a tube at the base, valvate in a single series; fruits generally torulose; leaves simple .. .. 3. **Maerua**
    Sepals free to the base or nearly to the base, imbricate or if in 2 series only the outer ones coherent and valvate:
      Sepals in 2 series; leaves simple:
        Stamens numerous; fruits not torulose .. .. 4. **Capparis**
        Stamens 4–8; fruits often subtorulose .. .. 5. **Cadaba**
      Sepals imbricate in a single series; leaves trifoliolate; stamens 8–20; fruits not torulose .. .. 6. **Crataeva**
      Sepals valvate in a single series; leaves trifoliolate or up to 5-foliolate, rarely 1-foliolate:
        Torus without an appendage at the base; stamens 12 to many; fruit not torulose 7. **Ritchiea**
        Torus with a linear appendage of united staminodes between the two larger petals; stamens 5–7; fruits unequally torulose .. .. .. 8. **Euadenia**
  Petals absent; leaves simple:
    Calyx imbricate:
      Small shrubs, with small leaves; flowers more or less shortly corymbose; stamens 4–5; fruit torulose or small and elliptic .. .. 5. **Cadaba**
      Trees; leaves large; flowers in rather long lax racemes; stamens indefinite; fruits large, ellipsoid .. .. 9. **Buchholzia**
    Calyx valvate in a single series:
      Fruit torulose; seeds numerous; calyx tubular at the base .. .. 3. **Maerua**
      Fruit entire, globose or ellipsoid; seeds few:
        Flowers racemose or subpaniculate; ovary 1-celled; fruit globose .. 10. **Boscia**
        Flowers axillary, solitary; ovary 2–3-celled; fruit ellipsoid .. 11. **Courbonia**

1. CLEOME Linn.—F.T.A. 1 : 74.

Leaves simple:
  Leaves ovate to orbicular, 1–2 cm. long, setose-pilose, the marginal hairs gland-tipped; fruits falcate, slightly recurved, about 2·5 cm. long, slightly muricate 1. *scaposa*
  Leaves lanceolate or linear-lanceolate, up to 6 cm. long, setulose on the nerves below; fruits nearly straight, ascending, about 6 cm. long, strigose-pubescent 2. *monophylla*
Leaves digitately compound:
  Leaflets filiform or linear:
    Branches and leaflets filiform; fruits not stipitate, 3·5–4 cm. long, 2 mm. broad; flowers small, about 4 mm. long .. .. 3. *tenella*
    Branches not filiform; leaflets linear:
      Fruits 3–6 cm. long, stipitate, 2 mm. broad; flowers 8–10 mm. long 4. *polyanthera*
      Fruits about 12 cm. long, stipitate; flowers large, 3 cm. long 5. *paradoxa*

Leaflets lanceolate to obovate :
Stems with prickles at the base of the leaves, and sometimes prickles also on the petioles ; lower leaves long-petiolate ; leaflets often 5–7, oblanceolate, acutely acuminate, up to 10 cm. long, the upper leaves gradually reduced to leafy subsessile bracts ; flowers in a corymbose raceme ; fruits long-stipitate 6. *spinosa*
Stems not prickly :
Fruits not stipitate ; plants glandular-pubescent :
Leaflets 3–6, often 5, about 3 cm. long ; pedicels up to 6·5 cm. long ; fruits about 9 cm. long .. .. 7. *viscosa*
Leaflets 3, mostly small, up to 1·5 cm. long ; pedicels slender, up to 1 cm. in fruit, the latter 1–1·25 cm. long, capped by the long slender style .. 8. *brachycarpa*
Fruits stipitate :
Leaflets 3–5, obovate, rounded or obtuse at the apex ; stems glandular-pilose ; flowers about 2 cm. long ; fruits glandular-puberulous .. .. 9. *foliosa*
Leaflets mostly 3, ovate-lanceolate, acute ; stems not glandular ; flowers about 1 cm. long ; fruits glabrous, striately nerved .. .. .. 10. *ciliata*

Cleome aculeata Linn., a native of trop. S. America, is introduced into Sierra Leone and Liberia.

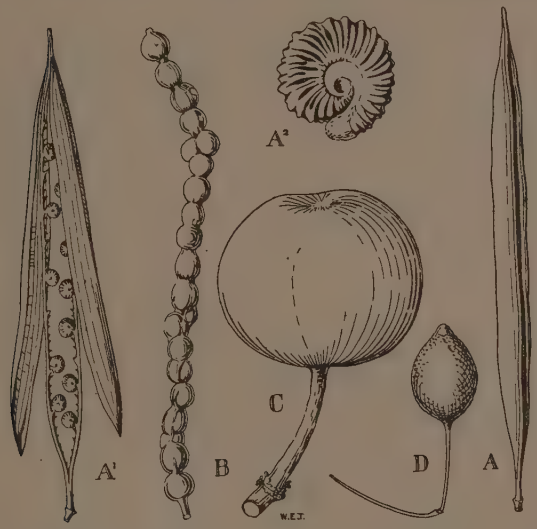

FIG. 25.—FRUITS OF CAPPARIDACEAE.

A, fruit of Cleome ciliata *Schum. & Thonn.*

A1, fruit open.

A2, seed.

B, fruit of Maerua angolensis *DC.*

C, fruit of Crataeva Adansonii *DC.*

D, fruit of Capparis Afzelii *Pax.*

1. **Cleome scaposa** *DC.*—Gilg & Benedict in Engl. Bot. Jahrb. 53 : 153. Erect slender branched herb, roughly setose.
N. Nigeria : Sokoto (Dec.) ! Also in Eastern Sudan, Abyssinia, Somaliland and Arabia. Exsicc.—*Moiser* 188.
2. **C. monophylla** *Linn.*—F.T.A. 1 : 76 ; Chev. Bot. 25. Erect herb, branching, up to 2 ft. ; flowers white to pink.
French Sudan : Kangala (May) ; Diaguara (June). N. Nigeria, various localities, up to 4,500 ft. ! Also throughout tropical Africa and subtropical South Africa. Exsicc.—*Barter* 796. (See Appendix).
3. **C. tenella** *Linn. f.*—F.T.A. 1 : 78 ; Chev. Bot. 25. An erect herb, 1–2 ft. high, glabrous, glaucescent, with abundantly forked branching.
French Sudan : Ile de Bourem (July). Senegal : Walo ! Extends to Eastern Sudan, Zanzibar, Madagascar, Socotra and India. Exsicc.—*Heudelot* 429. *Hussenot.*
4. **C. polyanthera** *Schweinf. & Gilg*—Gilg & Benedict l.c. 165. Erect herb, 1–2 ft. high, somewhat glandular ; flowers white or purplish.
N. Nigeria : Yola (July) ! Extends into Eastern Sudan. Exsicc.—*Dalz.* 179.
5. **C. paradoxa** *R. Br.*—F.T.A. 1 : 78 ; Chev. Bot. 25. Shrubby, 2–3 ft. high ; leaves 3–6 foliolate ; flowers conspicuous, in terminal racemes.
French Sudan : Goundam (Aug.) ! Also in Mauritania, Nubia, Abyssinia and Arabia. Exsicc.—*Chev.* 2490.
6. **C. spinosa** *Jacq.*—F.T.A. 1 : 78. Shrubby, up to 3–5 ft. ; flowers white to pink.
N. Nigeria : Abinsi (July) ! S. Nigeria : Oshogbo (April) ! Lagos Colony (Aug.) ! Calabar ! Victoria. Also in French Cameroons and Congo region ; a native of tropical S. America. Exsicc.—*Thomson* 118. *Millson* 5. *Dalz.* 742. (See Appendix).
7. **C. viscosa** *Linn.*—F.T.A. 1 : 80 ; Chev. Bot. 26. Erect herb, 1–2 ft. high. Flowers yellow.
French Sudan : Goundam (Aug.) ! Zinguette to Sompi (Aug.). Senegal : ? locality ! N. Nigeria : Sokoto (July) ! S. Nigeria : Lagos (Mar.) ! Also in Cape Verde Islands, Mauritania, Cameroons to Eastern Sudan, S. Arabia and Socotra. Exsicc.—*Heudelot* 426. *Dalz.* 380 ; 1390. (See Appendix).
8. **C. brachycarpa** *Vahl*—F.T.A. 1 : 77 ; Chev. Bot. 25. A low diffuse herb, with numerous branches from a woody rhizome.
French Sudan : Goundam (Aug.). Also in Mauritania, Eastern Sudan, Abyssinia, and on the coasts of the Red Sea to Arabia and India. Exsicc.—*Chev.* 2493 (not seen).

9. **Cleome foliosa** *Hook. f.*—F.T.A. 1 : 80 ; Chev. Bot. 25. Branches 1 ft. or more, erect, from a woody sometimes prostrate stem.
Dahomey : Atacora Mts. (June). Also south to Angola. Exsicc.—*Chev.* 23965.

10. **C. ciliata** *Schum. & Thonn.*—F.T.A. 1 : 78 ; Chev. Bot. 25. A weed of waste places and cultivated fields, 2–3 ft. high, suffrutescent. Flowers white, lilac or pink.
Widely distributed throughout the area. Also in Princes Isl., Cameroons and Congo to Angola. (See Appendix).

2. GYNANDROPSIS DC.—F.T.A. 1 : 81.

Leaves digitately 5-foliolate, long-petiolate ; leaflets obovate to oblanceoiate, acute or obtuse, slightly pubescent or glabrous ; bracts foliaceous, the lower trifoliolate, the uppermost becoming simple, subsessile ; inflorescence racemose, the lower flowers often already in fruit before the uppermost have opened ; flowers white to purplish ; fruits long-stipitate, the stipe composed of the gynophore and the slender base of the fruit, fruit-body about 6–7 cm. long, reticulate .. .. .. *pentaphylla*

G. **pentaphylla** *DC.*—F.T.A. 1 : 82 ; Gilg in Engl. Bot. Jahrb. 53 : 167, as *Pedicellaria* Schrank ; Holl. 1 : 54 ; Chev. Bot. 26. A herb, about 2 ft. high.
All over North and tropical Africa and India, occurring also in America. A weed of waste places and fields near villages ; used as a vegetable and native medicine. (See Appendix).

3. MAERUA Forsk.—F.T.A. 1 : 83 ; Gilg & Benedict in Engl. Bot. Jahrb. 53 : 232.

Leaves small or rather small, with the flowers borne on very short arrested lateral branchlets ; sepals broadly oblong-elliptic, rounded at the apex, 5–7 mm. long ; petals none or minute ; fruits torulose, few-seeded, softly pubescent 1. *crassifolia*

Leaves larger, borne on elongated shoots :

Leaves elliptic or ovate-lanceolate, mucronate, 4–6·5 cm. long, 2–3 cm. broad, long-petiolate ; sepals oblong, rounded at the apex, 1·25 cm. long ; fruits elongated, torulose, several-seeded .. .. 2. *angolensis*

Leaves oblong-lanceolate to linear ; fruits short, about 4-seeded :

Sepals about 1·5 cm. long ; petals obovate ; leaves of two sizes, the lower oblong, 7·5–9 cm. long, 2 cm. broad, the upper narrower, about 16 cm. long, 1–1·5 cm. broad 3. *angustifolia*

Sepals up to 1 cm. long ; petals linear or linear-lanceolate ; leaves more or less as above, but the longest only up to 8 cm. long and 8 mm. broad 4. *oblongifolia*

1. **M. crassifolia** *Forsk.*—Gilg & Benedict in Engl. Bot. Jahrb. 53 : 250. *M. rigida* R. Br.—F.T.A. 1 : 86 ; Chev. Bot. 27 ; Gilg & Benedict l.c. 251. *M. uniflora* Vahl. *M. trichocarpa* Gilg & Benedict l.c. 256. A tree, up to 20 or 30 ft. high, with often twisted branches and smooth bark ; flowers white, sweet-scented.
Mauritania : Adrar. French Sudan : Timbuktu (July) ! Senegal : Richard Tol (Feb.) ! N. Nigeria : Kuka (Feb.) ! Hadeija (Mar.) ! Sokoto (Feb.) ! Extends to Eastern Sudan, Egypt and Arabia. Exsicc. —*E. Vogel* 63. *Gay* 9. *Dalz.* 141. *Lely* 807. *Chev.* 1211. (See Appendix).

2. **M. angolensis** *DC.*—F.T.A. 1 : 86 ; Gilg & Benedict l.c. 257 ; Holl. 1 : 54. Chev. Bot. 26. Habit from a low shrub up to a tree of 30 ft. or more ; flowers white ; fruit up to 20-seeded or more.
French Sudan : various localities. Senegal : Lake Guier (Panié-Foul) (Jan.) ! Walo ! L. Cayar ! Mont-Roland (May–June). Gambia (July) ! Gold Coast : Ashanti, Amansare (July) ! N. Nigeria : Nupe ! Katagum (Jan.) ! Mutwe (Dec.) ! R. Benué ! Sokoto (Nov.–Mar.) ! Extends to Abyssinia, Angola, Mozambique and Transvaal. Exsicc.—*Perrottet & Leprieur* 89. *Heudelot. Barter* 1703. *Talb.* 537. (See Appendix).

3. **M. angustifolia** *A. Rich.* in Guill. & Perr. Tent. Fl. Seneg. 29, t. 8—Gilg & Benedict l.c. 259 ; Chev. Bot. 27. A low shrub, with stiff branches and rather thick leaves.
French Sudan : Gourma (July). Senegal : Richard Tol. Exsicc.—*Chev.* 24365 (not seen).

4. **M. oblongifolia** *A. Rich.*—F.T.A. 1 : 85 ; Gilg & Benedict l.c. 260. *M. dasyura* Gilg & Benedict l.c. 259. A low shrub ; flowers white, fragrant.
N. Nigeria : Kuka ! Katagum, Hadeija, Kadera (May) ! Abinsi (April) ! Also in Eastern Sudan to Red Sea and Arabia. Exsicc.—*E. Vogel* 68. *Dalz.* 138 ; 740.

4. CAPPARIS Linn.—F.T.A. 1 : 94 ; Gilg & Benedict in Engl. Bot. Jahrb. 53 : 184.

Branches never bearing spines, glabrous ; leaves obovate to oblong-oblanceolate, acuminate, 8–12 cm. long, 3–5 cm. broad, with about 10 prominently looped lateral nerves ; pedicels slender, 2·5 cm. long ; petals shorter than the sepals 1. *Afzelii*

Branches bearing stipular spines :

Leafless at time of flowering .. .. 2. *decidua*

Leafy at time of flowering :

Branches and leaves glabrous or the former slightly pubescent :

Flowers solitary or paired in the axils of the leaves or few and clustered at the end of a leafy shoot :

Petals broadly obovate, large, about 2–3 cm. long :

Leaves more or less rhomboid-elliptic, pointed, 3–8 cm. long ; spines about 4 mm. long ; pedicels stout, 2–2·5 cm. long ; petals at most emarginate ; ovary narrowly ellipsoid, ribbed .. .. 3. *erythrocarpa*

Leaves broadly elliptic, rounded at each end, emarginate, 4·5–6 cm. long, 2·5–3·5 cm. broad ; spines 4 mm. long, recurved ; petals bilobed ; ovary ovoid, not ribbed .. .. 4. *biloba*

Petals oblong or lanceolate, below 2 cm. long :
Leaves triangular at each end, more or less rhomboid ; spines minute ; pedicels under 1 cm. long, stout ; petals about 2 cm. long .. .. 5. *Warneckei*
Leaves rounded at the base, ovate ; spines about 3 mm. long ; pedicels slender, 3 cm. long ; petals 6–7 mm. long .. .. 6. *Welwitschii*
Flowers small in lax axillary simple or slightly branched racemes ; leaves lanceolate-elliptic, emarginate or mucronate, 3–6 cm. long, 2–2·5 cm. broad 7. *Thonningii*
Branches and leaves more or less tomentose :
Flowers rather small, about 1 cm. long ; leaves oblong or oblong-lanceolate, 3–5 cm. long, with a prominent midrib ; spines stout at the base, pubescent :
Calyx glabrous, coriaceous ; flowers clustered at the end of a short shoot ; pedicels 1–1·5 cm. long .. .. 8. *corymbosa*
Calyx pubescent or densely tomentose, more or less thin :
Flowers subfasciculate, about 4 in a fascicle ; pedicels nearly 1 cm. long ; leaves emarginate .. .. 9. *Rothii*
Flowers 8–12 in small cymes ; pedicels 4–6 mm. long ; leaves "rounded at both ends" .. .. 10. *Oliveriana*
Flowers larger, about 3 cm. or more long ; leaves oblong-elliptic, rounded or emarginate at the apex, 3–4 cm. long, 2–2·5 cm. broad ; calyx tomentose ; spines with a broad stout base, puberulous .. .. 4. *tomentosa*

1. **Capparis Afzelii** *Pax*—Gilg & Benedict in Engl. Bot. Jahrb. 53 : 199. *C. reflexa* A. Chev. Bot. 30, partly, not of Schum. & Thonn. A shrub or small tree with smooth red-brown bark and shining leaves ; flowers white, sometimes turning reddish ; fruit ellipsoid, 1–1½ in. long.
Sierra Leone : Benna (Jan.)! Dahomey : Hollis country, between Massé and Kétou (Feb.)! S. Nigeria : Lagos Colony! Barombi (Sept.)! Johann-Albrechtshöhe. Also in French Cameroons, Ubangi-Shari, Congo and Uganda. Exsicc.—*Afzelius*. *Sc. Elliot* 5453. *Foster* 56. *Preuss* 545. *Chev.* 23010.
2. **C. decidua** *Pax*—Gilg & Benedict l.c. 203. *C. aphylla* Roth—F.T.A. 1 : 95 ; Chev. Bot. 29. *C. sodata* R. Br. A shrub or small tree of desert regions, much branched, glabrous, with stipular spines ; often leafless except on young shoots and barren branchlets.
Mauritania : Adrar! N. Nigeria : Bornu, near L. Chad. Extending to Eastern Sudan, Arabia and India. Exsicc.—*Chev.* 25441 ; 25559 ; 28515. (See Appendix).
3. **C. erythrocarpa** *Isert*—F.T.A. 1 : 98 ; Gilg & Benedict l.c. 200. *C. Afzelii* DC., not of Pax. A shrub, usually climbing, or sometimes a small tree ; flowers white, often pink at the base of the stamens ; fruit scarlet, ribbed, about 2 in. long, edible, tasteless.
Sierra Leone : Talla Hills ; Ninia! Falaba (fr. April)! Limba (April)! Samu country (Dec.)! Ivory Coast : Cavally Basin (Aug.). Gold Coast : Accra (July, Nov.)! Dahomey : Zagnanado (Feb.). Extends to Congo and Angola, Eastern Sudan, Uganda and East Africa. Exsicc.—*Sc. Elliot* 4056 bis ; 4917 ; 5439. *T. Vogel* (no number). *Dalz.* 129.
4. **C. biloba** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A prickly woody climber ; flowers conspicuous, pink and white.
Gold Coast : Assuantsi (Sept.)! Exsicc.—*Dalz.* 160.
5. **C. Warneckei** *Gilg & Benedict* l.c. 201. A shrub, up to 6 ft. high ; young branches rather densely rusty pilose ; flowers whitish.
Togo : Lome (Sept.)! Exsicc.—*Warnecke* 258.
6. **C. Welwitschii** *Pax & Gilg* in Engl. Jahrb. 33 : 214. *C. viminea* Oliv.—F.T.A. 1 : 97, not of Hook. f. & Thoms. *C. holliensis* A. Chev. Bot. 30, partly. A scrambling prickly shrub ; flowers white.
Dahomey : Abbo village (Feb.)! N. Nigeria : Abinsi (Mar.)! Also in Angola. Exsicc.—*Dalz.* 769. *Chev.* 22959.
7. **C. Thonningii** *Schum.*—F.T.A. 1 : 97 ; Gilg & Benedict l.c. 190. *C. holliensis* A. Chev. Bot. 30, partly. A prickly scrambling or climbing shrub, with dark-green leaves and white fragrant flowers ; fruit orange or red, globose or shortly cylindrical, ½–¾ in. in diam.
Sierra Leone! Gold Coast : Accra (May)! Togo : Lome (Nov.)! Dahomey : Hollis country, Pobé (Feb.)! Abomey (Feb.)! S. Nigeria : Oyo! Abeokuta (Feb., fr. Aug.)! Exsicc.—*Forbes*. *Barter* 3326. *Irving* 66. *Warnecke* 60 ; 384. *Mildbraed* 7499. *Chev.* 22943 ; 23160. (See Appendix).
8. **C. corymbosa** *Lam.*—F.T.A. 1 : 96 ; Chev. Bot. 29, incl. var. *charii* Schinz. Scrambling prickly shrub ; flowers white ; fruit spherical, yellow.
Senegal! N. Nigeria : Kuka (April)! Samae (Mar.)! Dumbrum (Mar.)! Extends to Eastern Sudan and East Africa. Exsicc.—*Perrottet. E. Vogel* 90. *Foster* 23 ; 30. (See Appendix).
9. **C. Rothii** *Oliv.*—F.T.A. 1 : 97. Habit of the preceding, but flowers with shortly silky-pubescent calyx.
N. Nigeria : Hadeija (Mar.)! Extends to E. Sudan, Abyssinia, Upper Nile and Kenya. Exsicc.—*Dalz.* 139.
10. **C. Oliveriana** *Gilg* in Engl. Bot. Jahrb. 33 : 216. A prickly shrub, like the last, tawny, silky-tomentose on the young branches.
Sierra Leone. Exsicc.—*Afzelius* (not seen).
11. **C. tomentosa** *Lam.*—F.T.A. 1 : 96 ; Gilg & Benedict l.c. 189 ; Chev. Bot. 30. *C. polymorpha* A. Rich. in Guill. & Perr. Tent. Fl. Seneg. t. 5. A thorny climbing shrub ; flowers sweet-scented ; petals white ; stamens pink ; fruit orange-red, globose, 1–2 in. in diam.
Senegal : several localities! Casamance (Jan. Feb.)! Togo : ? locality. N. Nigeria : Kuka! Lake Chad! Hadeija (Mar.)! Katagum (fl. Feb., fr. June)! Extends to Angola, and to Abyssinia, Nile region, East Africa and Rhodesia. Exsicc.—*Heudelot. Perrottet. Sieber* 32. *Brunner* 91. *E. Vogel* 22. *Dalz.* 137. *Talb.* 509. (See Appendix).

5. CADABA Forsk.—F.T.A. 1 : 88 ; Gilg & Benedict in Engl. Bot. Jahrb. 53 : 222.

Leaves more or less orbicular, 1–3 cm. in diam., like the branchlets glandular-setose, distinctly petiolate ; petal 1, unguiculate, oblong, about 2 cm. long 1. *glandulosa*
Leaves oblong or elliptic, up to 2·5 cm. long and 1 cm. broad, like the branchlets mealy-puberulous, very shortly petiolate ; petals 4, linear or narrowly oval, clawed 2. *farinosa*

1. **C. glandulosa** *Forsk.*—F.T.A. 1 : 89 ; Gilg & Benedict in Engl. Bot. Jahrb. 53 : 225 ; Chev. Bot. 28. A low much-branched shrub ; fruit glandular-bristly, about ½ in. long.
French Sudan : Goundam (Aug.)! Tacadji (Aug.). Extends to the Red Sea and Arabia, Somaliland and East Africa. Exsicc.—*Chev.* 2508.

2. **Cadaba farinosa** *Forsk.*—F.T.A. 1 : 89 ; Gilg & Benedict l.c. ; Holl. 1 : 55 ; Chev. Bot. 27. A hoary shrub, branched from the base, erect or scrambling amongst other shrubs and trees. Fruit subtorulose, 1½–2½ in. long.
French Sudan and Senegal : many localities ! N. Nigeria : Katagum (Nov.) ! Argungu (Nov.) ! Sokoto (Nov.) ! Kuka ! Bure, Lake Chad (Dec.) ! All over the Sudan to the Red Sea and S. Arabia, and East Africa. Exsicc.—*E. Vogel* 19. *Elliott* 113. (See Appendix).

6. CRATAEVA Linn.—F.T.A. 1 : 99.

A tree ; branches glabrous ; leaves trifoliolate, appearing after the flowers ; leaflets ovate-lanceolate, narrowed into the petiolule at the base, acutely long-acuminate, about 9 cm., rarely up to 12 cm. long, 3–5 cm. broad, thinly papery, glabrous, finely reticulate below ; flowers white with the stamens and sometimes the tips of the petals lilac ; fruits subglobose, stoutly long-stipitate, 4–5 cm. or more in diameter, with a hard yellow pericarp .. .. *Adansonii*

C. **Adansonii** *D C. C. religiosa* Oliv., not of Forst.—F.T.A. 1 : 99 ; Chev. Bot. 31 ; Holl. 1 : 55. A tree, 15 to 20 ft. or more in height ; flowers appearing before the leaves, generally about February.
French Sudan : several localities. Senegal : Richard Tol (May) ! Walo ! Thiès (May to June). French Guinea : Kankan (Mar.) ! Kouroussa (Jan.) ! Dahomey : Djougou (June). N. Nigeria : various localities (Dec. to April) ! S. Nigeria : Lagos (Dec.) ! Fedeti ! Throughout the whole Sudan to Somaliland, also in N. Cameroons and Uganda. Exsicc.—*Sieber* 28. *Dollinger* 62. *Chev.* 567. *E. Vogel* 77. *Barter* 1103. *Elliott* 52. (See Appendix).

7. RITCHIEA R. Br.—F.T.A. 1 : 100 ; Gilg & Benedict in Engl. Bot. Jahrb. 53 : 173.

Leaves 3- or 5-foliolate (sometimes a few simple leaves occur in *R. longipedicellata*) :
Inflorescence very many-flowered, the pedicels closely arranged on the axis, leaving conspicuous and numerous scars :
Leaflets mostly 5, oblong-oblanceolate, acutely acuminate, gradually narrowed to the base, 15–20 cm. long, 5–7 cm. broad ; pedicels about 4 cm. long ; bracts lanceolate. 1·5–2 cm. long .. .. 1. *pentaphylla*
Leaflets 3 ; pedicels about 1·5 cm. long :
Leaflets very shortly and abruptly acuminate, cuneate at the base, up to 15 cm. long and 6 cm. broad, lateral nerves 8–10 .. .. 2. *erecta*
Leaflets acutely acuminate, rounded or very shortly cuneate at the base, up to 30 cm. long and 12 cm. broad, lateral nerves 6–8 .. .. .. 3. *obanensis*
Inflorescence few-flowered, the pedicels loosely arranged on the axis and rarely leaving scars :
Petals 4, spathulate or oblanceolate ; flowers more or less corymbose, large :
Lateral nerves slightly raised on the upper surface, not very prominent below ; leaflets oblong-elliptic, up to 20 cm. long and 7 cm. broad, the lateral ones subequal-sided at the base .. .. 4. *fragrans*
Lateral nerves impressed above, very prominent below ; leaflets ovate-rotundate, up to 12 cm. long and 7 cm. broad, the lateral ones very unequal-sided at the base 5. *fragariodora*
Petals numerous, mostly very narrow :
Petals not filiform, linear :
Leaflets abruptly and very shortly acuminate, sometimes the acumen bent back ; lateral nerves about 4 ; pedicels 4–5 cm. long .. .. .. 6. *longipedicellata*
Leaflets gradually acuminate ; lateral nerves about 6 ; pedicels about 2 cm. long 7. *polypetala*
Petals filiform :
Leaflets broadly elliptic, rather abruptly acuminate, 15–20 cm. long, 6–8 cm. broad, about 8-nerved .. .. 8. *glossopetala*
Leaflets ovate-lanceolate, acutely long-acuminate, 5–7 cm. long, up to 2·5 cm. broad, about 3-nerved .. .. 9. *macrantha*
All the leaves, or the lower ones, simple :
Leaves or leaflets ovate or ovate-elliptic ; lateral nerves 4–6 ; petals 4 :
Upper leaves sometimes trifoliolate ; flowers 2·5 cm. long ; sepals obovate, very acute, 2 cm. long, 8–9 mm. broad .. .. 10. *macrocarpa*
All the leaves simple :
Sepals oblong, 1·5 cm. long, 5 mm. broad, acutely long-acuminate ; flowers about 2·5 cm. long .. .. 11. *Afzelii*
Sepals broadly oblong-obovate, 2 cm. long, 9–10 mm. broad, obtusely mucronate ; flowers about 5 cm. long .. .. 12. *reflexa*
Leaves obovate-elliptic, acuminate, 15–20 cm. long, 5–7 cm. broad ; lateral nerves 8–10, depressed above, prominent and looped below ; inflorescence very shortly racemose ; sepals oblong-elliptic, acuminate ; petals about 20 .. 13. *simplicifolia*

1. **R. pentaphylla** *Gilg & Benedict* in Engl. Bot. Jahrb. 53 : 180. An erect shrub.
S. Nigeria : Lagos Colony (Aug., April) ! Abeokuta ! Ilaro (Jan.) ! Exsicc.—*Barter* 3378. *Millen* 102.
2. **R. erecta** *Hook. f.*—Gilg & Benedict l.c. 181. An erect shrub.
Fernando Po (Nov.) ! Exsicc.—*T. Vogel* 227.
3. **R. obanensis** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. An erect shrub.
S. Nigeria : Oban ! Fernando Po ! Exsicc.—*Talb.* 58. *Mann* (? number).

4. **Ritchiea fragrans** *R. Br.*—F.T.A. 1 : 100; Gilg & Benedict l.c. 176; Chev. Bot. 31. A shrub, erect or somewhat scandent.
Senegal: Casamance, Bignona (Feb.)! French Guinea: Iles de Los (Feb.). Sierra Leone: Bunce Isl. (Mar.)! Freetown! Rowala (July)! Liberia: Monrovia! ? locality (Jan.–April)! Ivory Coast: several localities. Togo: Boto. Dahomey: several localities! S. Nigeria: Lagos Colony! Awta! Yorubaland! Also in French Cameroons and Gabon. Exsicc.—*Kirk* 31. *Barter* 3377. *Sc. Elliot* (no number). *Whyte. Cook* 174.
5. **R. fragariodora** *Gilg*—Gilg & Benedict l.c. A more or less climbing shrub.
S. Nigeria: Calabar (Feb.)! Eket! Also in French Cameroons and Angola. Exsicc.—*Mann* 2263. *Talb.* 3147.
6. **R. longipedicellata** *Gilg*—Gilg & Benedict l.c. 181. A climbing shrub; fruit about 2–2½ in. long.
Togo: Afern. S. Nigeria: Lagos, Ikoyi (Jan., Feb.)! Abeokuta (Jan.)! Exsicc.—*Irving* 153. *Dalz.* 1150.
7. **R. polypetala** *Hook. f.* in Bot. Mag. t. 5344.—Gilg & Benedict l.c. 180; F.T.A. 1 : 101, under *R. fragrans* R. Br. An erect shrub; flowers large, about 4 in. in diam.; petals about 14.
S. Nigeria: Abeokuta! Exsicc.—*Mann* (Hort. Kew.).
8. **R. glossopetala** *Gilg*—Gilg & Benedict l.c. 182. A shrub, about 5 ft. high.
S. Nigeria: Cross River (Dec.)! Victoria. Exsicc.—*Holland* 231.
9. **R. macrantha** *Pax & Gilg*—Gilg & Benedict l.c. 180. A shrub.
S. Nigeria: Cross River (July)! Exsicc.—*Johnston.*
10. **R. macrocarpa** *Gilg*—Gilg & Benedict l.c. 182. A shrub or small tree, up to 20 ft. or more in height; fruit oval, 2–2½ in. long, over 1 in. wide in the middle.
Cameroons Mt.: Buea (fl. Jan., fr. April). Exsicc.—*Lehmbach* 180; 223. *Deistel* 427 (not seen).

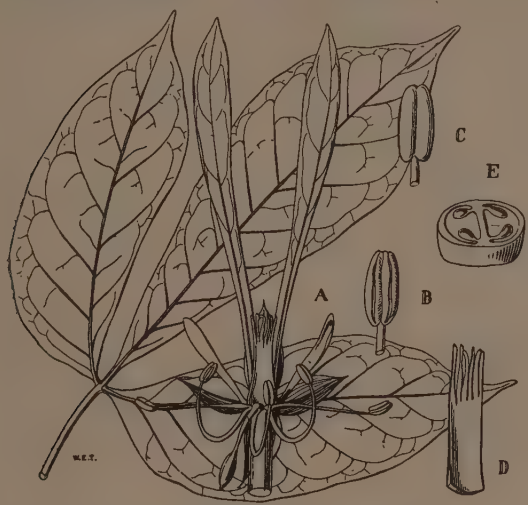

FIG. 26.—EUADENIA EMINENS *Hook. f.* (CAPPARIDACEAE).
A, flower.
B, anther.
C, anther from behind.
D, erect appendage composed of staminodes.
E, cross-section of ovary.

11. **R. Afzelii** *Gilg*—Gilg & Benedict l.c. 183. A shrub or tree.
French Guinea: Diaragouéba (Feb.)! Sierra Leone. Exsicc.—*Afzelius. Chev.* 477.
12. **R. reflexa** *Gilg & Benedict* l.c. *R. grandiflora* Gilg. *Maerua grandiflora* Pax. *Capparis reflexa* Schum. & Thonn.—F.T.A. 1 : 98. A glabrous shrub, erect or scandent; leaves 4–6 in. long, 1½–2½ in. broad.
French Guinea: Kouroussa (Feb.)! Gold Coast: Accra (Jan.–Mar.)! Shai Plains (Jan.)! Akroful! Adafo (Nov.). Togo: Akepe; Ho; Tafisohi Mts. Lome (Nov.)! S. Nigeria: Lagos! Exsicc.—*Warnecke* 61. *Mildbraed* 7508. *Dalz.* 130.
13. **R. simplicifolia** *Oliv.*—F.T.A. 1: 100; Gilg & Benedict l.c. A shrub, 4–6 ft.
S. Nigeria: Cameroons River (Jan.)! Also in French Cameroons and Spanish Gabon. Exsicc.—*Mann* 2190.

8. EUADENIA Oliv.—F.T.A. 1 : 90.

Racemes short and subcorymbose; pedicels stout, 5–6 cm. long; leaflets subsessile, about 15 cm. long; petals sulphur-yellow .. .. 1. *eminens*
Racemes elongated; pedicels slender, not more than 3 cm. long; leaflets distinctly petiolulate; petals green:
Leaflets shortly acuminate, up to 12 cm. long, petiolules subequal; sepals about 0·75 cm. long .. .. 2. *trifoliolata*
Leaflets long-tailed-acuminate, up to 15 cm. long, the terminal petiolule usually longer than the lateral; sepals about 1·25 cm. long .. .. .. 3. *monticola*

1. **E. eminens** *Hook. f.* Bot. Mag. t. 6578—Gilg & Benedict in Engl. Bot. Jahrb. 53 : 170. *E. major* Hua—Chev. Bot. 32. A branching rather soft-wooded shrub, 2–5 ft. high; inflorescence candelabriform, with a strong odour; fruit unequally torulose, 6–10 in. long.
Sierra Leone: various localities! Liberia: Sino Basin! Grand Bassa. ? locality! Ivory Coast: Sanvi (Mar.)! Fort Binger (July)! Assikasso (Dec.)! Gold Coast: Cape Coast! Adija (May)! Exsicc. —*Mann* 872. *Sc. Elliot* 4758; 5447. *Chev.* 17692; 19530; 22600. *Cook* 420. (See Appendix).
2. **E. trifoliolata** *Oliv.*—F.T.A. 1 : 91, partly; Gilg & Benedict l.c. A shrub, 6–12 ft. high; petals green at first, turning red.
Togo. S. Nigeria: Lagos Colony (Aug.)! Epe (Feb.)! Abeokuta! Degema! Calabar (Feb.)! Exsicc.—*Barter* 3386. *Mann* 2276. *Millen* 169. *Talb.* (no number).
3. **E. monticola** *Gilg & Benedict* l.c. A shrub or tree, up to 30 ft.; flowers greenish.
Cameroons Mt.: Buea (Nov.–Jan.)! Exsicc.—*Mann* 1178.

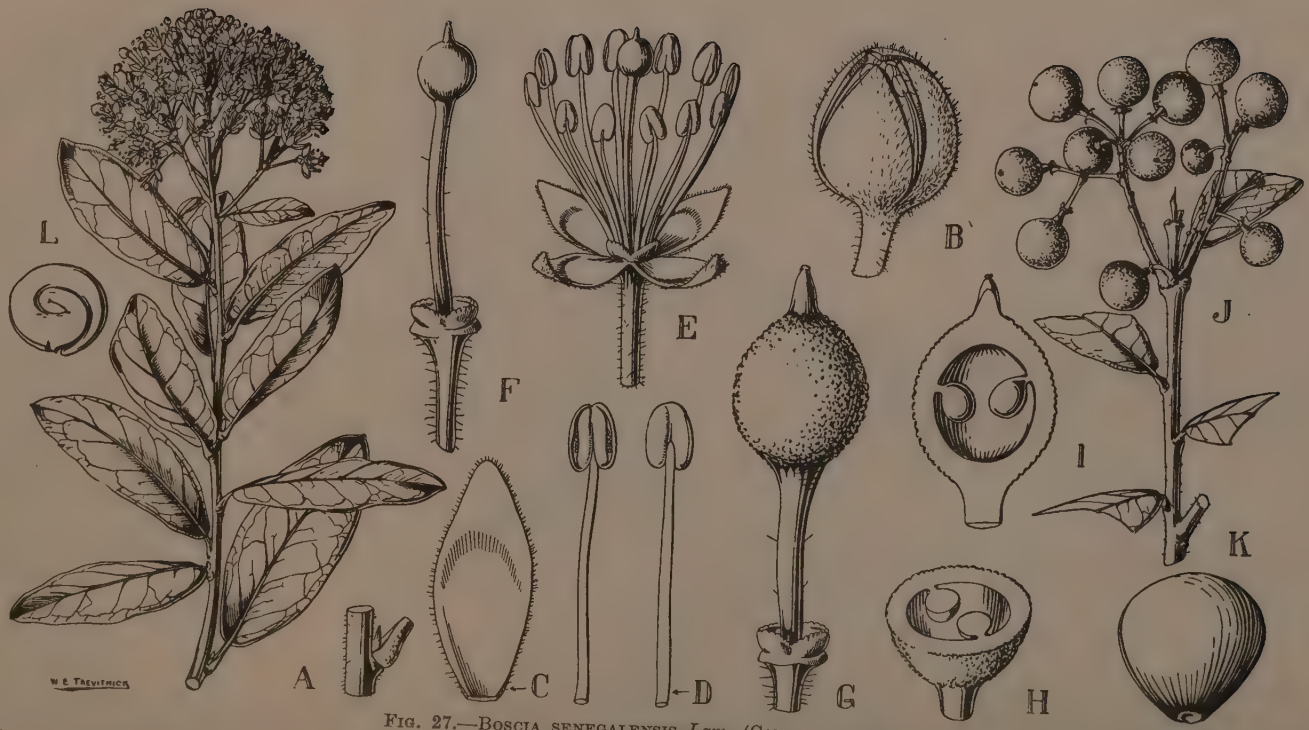

FIG. 27.—BOSCIA SENEGALENSIS *Lam.* (CAPPARIDACEAE).

A, petiole with axillary bud. B, flower-bud. C, sepal. D, stamens, front and back. E, flower. F, ovary with gynophore and disk. G, the same in fruit. H, cross-section of fruit. I, vertical section of same. J, fruiting branch. K, seed. L, embryo.

9. BUCHHOLZIA Engl. Bot. Jahrb. 7 : 335—Gilg & Benedict in Engl. Bot. Jahrb. 53 : 213.

Branchlets stout, glabrous ; leaves elongate-obovate or elliptic, shortly acuminate, 18–27 cm. long, 8–10 cm. broad, thinly coriaceous, glabrous ; midrib very prominent below ; lateral nerves about 10, arcuate, looped, prominent below ; veins very lax ; petiole up to 12 cm. long, swollen for about 1 cm. at the apex; racemes axillary, simple or slightly branched, up to 15 cm. long ; pedicels 0·5–1 cm. long ; bracts small, hook-like ; flowers about 1·5 cm. long ; sepals broad, 3 mm. long ; stamens numerous ; fruit ellipsoid, about 9 cm. long, 6 cm. broad, with thick woody endocarp about 8 mm. thick ; seeds large, few ; stipe 1·5 cm. long, stout .. .. .. *coriacea*

B. coriacea *Engl.* Bot. Jahrb. 7 : 335—Pax in Engl. Bot. Jahrb. 14 : 301, t. 4. *B. macrophylla* A. Chev. Bot. 29, not of Pax. *B. Englerí* Gilg. A tree, 30–60 ft. ; fruit yellowish when ripe, from "the size of a walnut fruit" up to "the size of the fist" ; seeds spicy-tasted.
Ivory Coast : Bingerville ! Alépé ! and other localities. S. Nigeria : Eket ! Johann-Albrechtshöhe ! Also in French Cameroons. Exsicc.—*Staudt* 764. *Talb.* 3368. (See Appendix).

10. BOSCIA Lam.—F.T.A. 1 : 91 ; Gilg & Benedict in Engl. Bot. Jahrb. 53 : 203.

Leaves elongate-lanceolate or linear, willow-like, very acute, up to 12 cm. long, 1–1·5 cm. broad, midrib prominent below and often straw-coloured, with rather obscure ascending lateral nerves ; inflorescence densely racemose, usually leafless, shortly tomentose ; fruit smooth and shining, 1–1·25 cm. in diam. .. 1. *salicifolia*

Leaves shortly lanceolate or oblong-lanceolate, up to 5 cm. long, 1–1·5 cm. broad, mucronate to retuse, very finely and closely reticulate, glabrous ; inflorescence accompanied by the leaves, shortly racemose, slightly pubescent, terminating short leafy branchlets ; fruit pitted and rugulose, globose, 1–1·25 cm. in diam. 2. *angustifolia*

Leaves elliptic to ovate-elliptic, obtuse or mucronate, up to 9 cm., very rarely up to 14 cm. long, 2–4 cm. broad, with about 5–6 lateral nerves raised on both surfaces and prominently looped, distinctly reticulate, glabrous or more usually finely pubescent ; racemes accompanied by the leaves, short, crowded, corymbose, thinly pilose ; fruit globose, 1–1·5 cm. in diam., warted and sometimes slightly tomentellous 3. *senegalensis*

1. **B. salicifolia** *Oliv.*—F.T.A. 1 : 93 ; Chev. Bot. 28 ; Gilg & Benedict in Engl. Bot. Jahrb. 53 : 211. A tree, up to 40 ft. high, with "graceful drooping foliage."
French Sudan : Gourma ; Penconga (July). N. Nigeria : Sokoto (Jan.) ! Yola (Feb.) ! Exsicc.—*Gilman* 2. *Dalz.* 182. *Chev.* 24456. (See Appendix).
2. **B. angustifolia** *A. Rich.* in Guill. & Perr. Tent. Fl. Seneg. 26, t. 6—F.T.A. 1 : 92 ; Gilg & Benedict l.c. 210 Chev. Bot. 28. A shrub or small tree, with glabrous branches ; flowers greenish, fragrant.
French Sudan : Koulikoro (Oct.). Ouacoro (Oct.) ! Senegal : Tivouane (Dec.) ! Thies (Dec.) ! N Nigeria : Sokoto to Birnin Kebbi (Oct.) ! Nupe ! Extends to Ubangi, East Sudan, Abyssinia and S. Arabia. Exsicc.—*Barter* 1730. *Chev.* 2497 ; 2499 ; 2501. (See Appendix).
3. **B. senegalensis** *Lam.*—F.T.A. 1 : 92 ; Holl. 1 : 55 ; Chev. Bot. 29 ; Gilg & Benedict l.c. 209. *B. octandra* Hochst. A shrub or small tree ; flowers scented.
Mauritania : S. Adrar. French Sudan and Senegal : various localities ! Sierra Leone. N. Nigeria : various localities from Birnin Kebbi to Bornu (Oct. to Mar.) ! Extends into Eastern Sudan and Abyssinia. Exsicc.—*Debeaux* 179. *Chev.* 1071. *Farmar* 136. *E. Vogel* 93. *Elliott* 117. (See Appendix).

11. COURBONIA A. Brongn.—F.T.A. 1 : 87 ; Gilg & Benedict in Engl. Bot. Jahrb. 53 : 216.

A glaucous glabrous shrub ; branches long and slender, leafy, ribbed ; leaves lanceolate to elliptic, acutely acuminate, 2–3 cm. long, almost sessile, mostly obscurely 3-nerved ; flowers solitary, axillary ; pedicel 2 cm. long ; sepals united at the base, free part ovate, about 1 cm. long, acute ; fruits ovoid or ellipsoid, beaked, 2 cm. long, long-stipitate, smooth .. .. *pseudopetalosa*

C. pseudopetalosa *Gilg & Benedict* in Engl. Bot. Jahrb. 53 : 217. *C. virgata* Oliv.—F.T.A. 1 : 88, partly, not of A. Brongn. ; Chev. Bot. 27. A low shrub or undershrub, 1–2 ft. high, with straight branches from a woody rhizome ; flowers greenish-white ; stamens white.
French Sudan : Gourma (July). Senegal ! N. Nigeria : Bornu, Maiduguri ! Lake Chad ! Also in N. Cameroons. Exsicc.—*Heudelot* 198. *Talb.* 1217. *Elliott* 131.
Formerly included in *C. virgata* A. Brongn., which extends from the Central Shari to the Eastern Sudan, and which differs in its more pointed buds and sepals, lobulate disk, and shortly pointed leaves.

17. MORINGACEAE

Trees with gummy bark. Leaves deciduous, alternate, 2–3 times pinnate, pinnae opposite ; stipules none, or represented by stipitate glands at the base of the petioles and pinnae. Flowers in axillary panicles, white or red, hermaphrodite, zygomorphic. Calyx-tube short, with 5 unequal spreading or reflexed lobes, the fifth posticous, imbricate. Petals 5, the two upper smaller, the lateral ones ascending, the anticous larger. Disk lining the calyx-tube, with a short free margin. Stamens inserted on the margin of the disk, declinate, 5 perfect, alternating with the same number of antherless stamens or reduced to

setae ; filaments free ; anthers dorsifixed, 1-celled, opening lengthwise by a slit. Ovary stipitate, terete, villous, curved, 1-celled, with 3 parietal placentas ; style terminal, slender, tubular, truncate at the apex ; ovules numerous, in 2 series on each placenta. Capsule long, beaked, 3–6-angled, torulose, 1-celled, 3-valved. Seeds 3-winged or not ; embryo without endosperm, straight.

Natives of India and Arabia, but now introduced into the tropics generally. Easily recognised by the compound-pinnate leaves, zygomorphic flowers, shortly stipitate ovary with parietal placentas, and the long fruit and winged seeds.

MORINGA Juss.—F.T.A. 1 : 101.

A tree with soft wood and pale bark ; leaves 2–3-pinnate ; rhachis softly pubescent ; leaflets opposite, up to about 5-pairs, the terminal one larger, all more or less elliptic, rounded at each end, shortly petiolulate, 1–2 cm. long, glaucous beneath and very slightly pubescent ; flowers white, paniculate ; calyx-tube campanulate, lobes 5, longer than the tube, finely pubescent ; petals unequal, slightly longer than the

Fig. 28.—Moringa pterygosperma *Gaertn.* (Moringaceae).

A, flower.

B, longitudinal section of flower.

C, cross-section of ovary.

D, fruit.

E, portion of fruit opened.

F, seed.

After Volkens.

sepals ; fruit 3-angled, elongate-linear, about 1 ft. long ; seeds globose, with 3 membranous wings produced beyond the ends .. .. *pterygosperma*

M. pterygosperma *Gaertn.*—F.T.A. 1 : 101 ; Holl. 1 : 55 ; Chev. Bot. 163.
Native of India and Arabia, introduced all over tropical Africa. (See Appendix).

18. CRUCIFERAE

Annual or perennial herbs, rarely somewhat shrubby, with watery juice. Indumentum of simple, medifixed or stellate hairs, rarely glandular. Leaves alternate or rarely opposite ; stipules absent. Flowers hermaphrodite, mostly actinomorphic, usually racemose, rarely bracteate. Sepals 4, free, imbricate in 2 series, rarely valvate. Petals 4, rarely 0, mostly equal, often long-clawed, imbricate or contorted. Glands mostly present on the torus, often opposite the sepals. Stamens 6, tetradynamous, very rarely numerous or fewer, free or connate in parts ; anthers 2- (rarely 1-) celled, opening lengthwise. Ovary sessile or rarely stipitate, usually of 2 united carpels, 1-celled with 1–2 parietal placentas and divided by a spurious membranous septum, or sometimes transversely several- or many-celled ; stigmas 2, free or connate ; ovules usually many. Fruit elongated (siliqua) or short (silicule), bivalved or indehiscent, rarely transversely jointed. Seeds without endosperm (very rarely a little endosperm present) ; embryo usually folded ; cotyledons accumbent or incumbent.

A large natural family widely spread throughout the world, but poorly represented in our area. At once recognised by the herbaceous habit, four sepals and petals, and six stamens, four of which are longer and two shorter (tetradynamous).

Indumentum of many-rayed stellate hairs ; fruits not compressed :
Fruits elongate, glabrous, with persistent incurved stigmas ; outer sepals conspicuously saccate at the base .. .. 1. **Matthiola**
Fruits rather short, becoming curved, stellate-pubescent, with persistent recurved stigmas ; outer sepals not saccate at the base .. .. .. 2. **Morettia**
Indumentum of 2-armed medifixed T-shaped hairs ; fruits compressed, with the sutures marginal, appressed-pubescent ; sepals not pouched at the base ; leaves linear ; seeds broadly winged .. .. 3. **Farsetia**
Glabrous or slightly pubescent, with simple hairs :
Fruits linear, much longer than broad :
Fruits with a strongly marked midrib between the sutures .. .. 4. **Brassica**
Fruits without a distinct midrib between the sutures :
Seeds usually in 2 series ; fruits comparatively short ; leaves pinnately divided 5. **Nasturtium**
Seeds in a single series ; fruits rather elongate ; leaves pinnately partite or trifoliolate .. .. 6. **Cardamine**
Fruits nearly as broad as long, more or less elliptic and winged :
Fruits small, narrowly winged only towards the apex; leaves much divided into linear segments ; seeds subturgid .. .. 7. **Lepidium**
Fruits fairly large, broadly winged all round ; leaves deeply cordate and amplexicaul at the base, entire ; seeds flattened .. .. 8. **Schouwia**

1. MATTHIOLA R. Br.—F.T.A. 1 : 57.

A hoary herb ; leaves pinnately lobed, about 5 cm. long, villous with stellate hairs ; flowers in slender leafless racemes ; pedicels very short ; outer sepals saccate at the base, about 1 cm. long, shortly stellate-pubescent ; petals linear, nearly twice as long as the sepals ; fruits linear, about 10 cm. long, with a few scattered stipitate glands on the sutures ; seeds numerous in a single row .. .. *maroccana*

M. maroccana *Coss.* in Bull. Soc. Bot. Fr. 27 : 68 (1880)—Chev. Bot. 23. Herb, up to 18 in. high.
Mauritania : Agnelmi Melles (Feb.–Mar.). Exsicc.—*Chev.* 28841 (not seen).

5. MORETTIA DC.—F.T.A. 1 : 61.

Stems woody, branched ; leaves scattered, petiolate, obovate-oblanceolate, subacute, 1–2 cm. long, entire, scabrid-pubescent on both sides with stellate hairs ; flowers in short racemes, small ; pedicels very short ; sepals woolly-pubescent, 3–4 mm. long ; petals slightly longer ; fruits becoming curved, about 1·5 cm. long, stellate-pubescent, tipped by the hardened bifid persistent style .. .. *canescens*

M. canescens *Boiss.* Diagn., ser. I, 8 : 17 (1849)—Chev. Bot. 23.
Mauritania : numerous localities. Extends into Arabia. Exsicc.—*Chev.* 25440 (not seen).

3. FARSETIA Desv.—F.T.A. 1 : 61.

Stems woody, densely covered with closely appressed T-shaped hairs ; leaves linear, obtuse, entire, 1-nerved, 4–5 cm. long, scarcely 0·5 cm. broad, covered on both surfaces with long appressed T-shaped hairs ; flowers few, in lax racemes, rather small ; sepals 4–5 mm. long, pubescent ; petals slightly longer ; fruits oblong, with sinuate margins, 2–2·5 cm. long, rather densely covered with appressed T-shaped hairs, 4–5-seeded, beaked with the persistent style .. .. .. 1. *ramosissima* var. *macrocarpa*
Stems and leaves as above, but greener and the leaves narrower and longer in proportion ; flowers in elongated racemes, rather large ; sepals 1 cm. long, with membranous margins ; petals linear-spathulate, about 2 cm. long ; fruits linear, with nearly straight margins, distinctly 1-nerved, about 4 cm. long, rather thinly pubescent, with appressed hairs, beaked ; seeds numerous .. .. .. 2. *stenoptera*

1. **F. ramosissima** *Hochst.* var. **macrocarpa** *Schweinf.*
Mauritania : Arouit (Mar.) ! Adrar, etc. ! French Sudan : Goundam, near Timbuktu (Aug.) ! Also in the Nile districts. Exsicc.—*Chev.* 2554.
2. **F. stenoptera** *Hochst.* ex *Fourn.* in Bull. Soc. Bot. Fr. 11 : 56 (1864). *F. grandiflora* Fourn.—F.T.A. 1 : 62 ; Chev. Bot. 23.
French Sudan : Ouahigouya (Aug.) ; Yatenga (Aug.). Extends through Bagirmi to the Nile districts. Exsicc.—*Chev.* 24736 ; 24776.

4. BRASSICA Linn.—F.T.A. 1 : 65.

An erect herb, up to 1 m. high or more, glabrous or nearly so ; lower leaves lyrate, upper obovate, crenate to subentire, petiolate ; racemes with leafy bracts at the base ; flowers yellow ; fruits pedicellate, linear, beaked with the long persistent style, about 3 cm. long, 4-ribbed and distinctly nervose, smooth ; seeds subglobose, very finely pitted .. .. *juncea*

B. juncea *DC.*—F.T.A. 1 : 65 ; Chev. Bot. 24.
French Guinea : Kankan (Mar.) ! Faraba (Jan.). Konanké Country (Feb.) ! Exsicc.—*Chev.* 592.
(See Appendix).

5. NASTURTIUM R.Br.—F.T.A. 1 : 57.

A weak almost stemless glabrous herb; leaves thin, irregularly pinnate, 8–20 cm. long; leaflets ovate or rounded, toothed or sinuate; inflorescence radical, leafless, nearly as long as the leaves; pedicels very short; fruit linear-lanceolate, narrowed into a distinct style, 0·8–1·5 cm. long .. .. 1. *humifusum*

Habit similar to above, but leaves not more than 4 cm. long and inflorescence terminating leafy shoots; fruits oblong-lanceolate, about 5 mm. long, with a very short style 2. *benuense*

1. **N. humifusum** *Guill. & Perr.*—F.T.A. 1 : 58; Chev. Bot. 23. A weed of marshy places.
Senegambia: Walo district (Nov.–Mar.)! Ivory Coast: Toura, 3,000 ft. (May); Ano (Dec.); Comoé Valley (Dec.). Also in Lower Congo and Angola. Exsicc.—*Perrottet. Heudelot.*
2. **N. benuense** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A weed in stream beds.
N. Nigeria: Abinsi (April)! Exsicc.—*Dalz.* 746.

6. CARDAMINE Linn.—F.T.A. 1 : 60.

Leaves pinnate, up to about 6 cm. long, leaflets rounded at the apex, glabrous or slightly hairy; fruits slender, 1·2–1·5 cm. long; pedicels about 0·5 cm. long 1. *hirsuta*

Leaves trifoliolate, long-petiolate, up to 12 cm. long including the petiole, leaflets ovate, acute, coarsely crenate-dentate, with distinct petiolules about 1 cm. long, setulose-pubescent on both surfaces; fruits 3–4 cm. long; pedicels about 1 cm. long 2. *africana* var. *pubescens*

1. **C. hirsuta** *Linn.*—F.T.A. 1 : 61. A small annual, often much-branched or tufted at the base.
Cameroons Mt., 8,000–10,000 ft. (Nov.)! Fernando Po, 7,500–8,500 ft. Common in temperate regions. Exsicc.—*Mann* 1460; 2032. Chevalier also records it from the mountains of the Ivory Coast (see Comptes Rend. 1909, 2 : 459).
2. **C. africana** *Linn.* var. **pubescens** *Hook. f.*—F.T.A. 1 : 60. A weak herb, 1–2 ft., with white flowers.
Fernando Po, 7,500 ft.! Exsicc.—*Mann* 1448.
Scarcely different from typical *C. africana* Linn., which occurs in the mountains of East and South Africa, and South India.

7. LEPIDIUM Linn.—F.T.A. 1 : 68.

An erect glabrous annual; leaves variable, often deeply pinnatisect, with linear segments; flowers shortly racemose, white, small; fruits compressed, broadly elliptic, emarginate, slightly winged towards the top, 5–6 mm. long, about 4 mm. broad; seeds ellipsoid, smooth, 3 mm. long, brown or red .. .. .. *sativum*

L. sativum *Linn.*—F.T.A. 1 : 69; Chev. Bot. 24.
Commonly cultivated in the regions away from the coast. The Common Cress. (See Appendix).

8. SCHOUWIA DC.—F.T.A. 1 : 67.

A woody glabrous herb, branching from the base; cauline leaves sessile, amplexicaul, oblong-lanceolate, deeply cordate-auriculate at the base, acute, 4–8 cm. long, 2–4 cm broad, papery, distinctly nervose; flowers racemose; sepals oblong, about 1 cm. long, with narrowly membranous margins; petals slightly longer, purplish; fruit compressed, winged, broadly elliptic, 2·5 cm. long, tipped by the persistent acute style about 0·5 cm. long .. .. *arabica*

S. arabica *DC.*—F.T.A. 1 : 68; Chev. Bot. 24.
Mauritania: near Tourure, Bagdada, etc. (Sept.). French Sudan: Mossi (July), common in Guinea Cornfields. Also in Abyssinia, Egypt, Arabia, etc. Exsicc.—*Chev.* 24581; 28560; 28816 (not seen).

19. VIOLACEAE

Herbs, shrubs, or small trees. Leaves alternate or rarely opposite, stipulate. Flowers actinomorphic or zygomorphic, from solitary to paniculate. Sepals 5, imbricate. Petals 5, nearly equal or the lower larger and often clawed, imbricate. Stamens hypogynous, 5, alternate with the petals; anthers 2-celled, opening lengthwise, with the connective produced beyond the cells. Ovary superior, sessile, 1-celled, with usually 3 parietal placentas each with one or more ovules; style usually simple. Fruit an elastic loculicidal capsule, one- or more-seeded. Seeds with fleshy endosperm and central mostly straight embryo.

A widely spread family, the woody members mostly in the tropics, the herbaceous at higher altitudes and in temperate regions. Recognised by the often zygomorphic flowers, definite stamens with produced connective, and parietal placentation.

Trees or shrubs; flowers more or less actinomorphic; petals subequal 1. **Rinorea**

Herbaceous or suffrutescent; flowers zygomorphic:

Lower petal conspicuously larger than the rest and clawed, saccate or gibbous at the base; sepals not produced below the base; seeds often longitudinally striate; stipules entire .. .. 2. **Hybanthus**

Lower petal not clawed at the base, spurred or saccate; sepals produced below the base; seeds smooth; stipules foliaceous, divided .. .. 3. **Viola**

1. RINOREA Aubl.—F.T.A. 1 : 106, as *Alsodeia* Thouars.

By T. F. Chipp

Leaves spinose-dentate : .. .. 1. *ilicifolia*
Leaf-margin not spiny :
Petals entirely reflexed and overlapping the sepals, 0·5 cm. long ; pedicels 0·5 to 1 cm. long ; petioles 2–4 cm. long, winged by the decurrent lamina ; leaves acuminate, base somewhat cuneate ; flowers apparently borne directly on the branches 2. *obanensis*
Petals not reflexed or only at the tip :
Leaves subauriculate at the base :
Lamina up to 15 cm. long :
Margin of leaf obtusely serrate in upper part only, main lateral nerves 12–16 each side ; bush to 0·5 m. high.. .. .. 3. *Bussei*
Margin of leaf denticulate from base to apex, main lateral nerves 9–12 each side ; tree to 7 m. high .. .. 4. *kibbiensis*
Lamina 20–30 cm. long, 9 cm. broad, oblanceolate, acuminate ; petioles 0·7–1 cm. long ; panicle half as long as the leaves ; petals 0·35 cm. long, nearly twice as long as the sepals .. .. 5. *oblanceolata*
Leaves obtuse, acute or cuneate at the base :
Sepals markedly ribbed fanwise :
Filaments short ; petioles 3–6 cm. long ; lamina subcoriaceous, lanceolate ; sepals ovate, concave ; staminal appendage short, ovate, emarginate .. 6. *Afzelii*
Anthers sessile ; petioles 1–4 cm. long :
Lamina 15–20 cm. long, 4 -8 cm. broad ; staminal appendage rounded at the apex, connective produced into a spoon-shaped process not ¼ length of anther 7. *prasina*
Lamina 15–27 cm. long, 6–10 cm. broad ; staminal appendage subacute at the apex, connective produced into a filamentous process half the length of the anther .. .. 8. *crassifolia*
Sepals not markedly ribbed or midrib only prominent :
Leaves glandular beneath :
Petioles up to 1 cm. long, in the younger leaves generally 0·5 cm. long :
Extremities and rhachis glabrous ; lamina oblong, narrowing into the acumen ; sepals 0·6 cm. long, 0·4 cm. broad ; staminal tube free at the margin, lobed behind the anthers, connective produced beyond the anthers and slightly emarginate at the tip ; ovary pubescent .. .. .. 9. *Johnstonii*
Extremities and rhachis pubescent ; lamina oblong, narrowing into the acumen ; sepals 0·4 cm. long, 0·2 cm. broad ; staminal tube not free, connective produced beyond the anthers and bifid ; ovary pubescent .. .. 10. *Talbotii*
Extremities and rhachis covered with short rather stiff hairs ; lamina oblanceolate, abruptly acuminate ; sepals 0·2 cm. long, 0·15 cm. broad ; staminal tube free at the margin with long narrow lobes behind the anthers, connective produced beyond the anthers into a spoon-shaped process ; ovary with stiff hairs .. .. 11. *punctata*
Petioles 1 to several cm. long :
Connective not produced beyond the anther-lobes, which are crowned with a tuft of hairs ; petiole 3–8 cm. long, about ¼ length of lamina, which is elliptic-oblanceolate, acuminate, 3 or more times as long as broad ; inflorescence to 20 cm. long ; sepals rounded, 0·1 cm. long and broad ; petals more than twice as long ; fruit sparsely pilose, the surface softly downy.. 12. *longicuspis*
Connective distinctly produced beyond the anthers :
Anthers sessile, the produced part of the connective not divided :
Lamina 10–15 cm. long, 3–5 cm. broad, markedly cuneate at the base, narrowing into an acuminate apex and with a markedly serrate margin ; rhachis of inflorescence pilose ; sepals 0·2 cm. long ; petals 2–2½ times longer ; ovary pilose ; (Sierra Leone) .. .. 13. *Elliotii*
Lamina 20–30 cm. long, 10–14 cm. broad, subacute to obtuse at base, apex rounded and abruptly acuminate, margin obscurely and distantly dentate ; rhachis of inflorescence minutely pubescent ; carpels glabrous ; (Cameroons) 14. *kamerunensis*
Filaments distinct :
Produced part of connective bifid ; branchlets, midrib and nerves glabrous or nearly so ; leaves oblanceolate to narrowly obovate, gradually acuminate, cuneate at the base, 8–12 cm. long, 3–5 cm. broad, slightly serrate 15. *arenicola*
Produced part of connective entire ; branchlets, midrib and nerves of the leaves bristly pilose ; leaves obovate-elliptic, rather abruptly acutely acuminate, obtuse or subacute at the base, 20 cm. or more long, 8–10 cm. broad, coarsely serrate .. .. 16. *djalonensis*

Leaves not glandular beneath :
Flowers 1 or few in the axils of the leaves or in a very short raceme about 0·5 cm. long ; tree with linear elongated stipules, a distinct though short inflorescence and flowers with long slender pedicels ; leaves glabrous, obtuse or rounded at the base ; petioles up to 0·5 cm. long ; staminal tube-lobes opposite the anthers ; ovary minutely tuberculate .. .. 17. *breviracemosa*
Inflorescence 1 to several cm. long :
Ovary pilose :
Petioles 1–3 cm. long ; lamina about 9–18 cm. long :
Leaves membranous, 9–10 cm. long ; inflorescence paniculate, glabrous ; sepals glabrous, medianly thickened ; filaments short ; connective hardly produced beyond the anthers ; ovary sparsely pilose 18. *Aylmeri*
Leaves subcoriaceous, 15–18 cm. long ; inflorescence spiciform, pubescent ; sepals externally strigose ; anthers sessile ; connective where produced beyond the anthers spoon-shaped ; ovary densely pilose 19. *pilosa*
Petioles 3 to several cm. long ; lamina 15–26 cm. long, closely dentate, beneath irregularly reddish-tinted, 5–7 cm. broad ; staminal tube-margin not free ; anthers pilose ; ovary densely sericeous-pilose .. .. 20. *rubrotincta*
Ovary furfuraceous, glabrous, or at first pubescent :
Petioles 2–8 cm. long :
Sepals densely hispid ; lamina elliptic-oblanceolate, narrowing at the base, shortly acuminate, to 23 cm. long, to 9 cm. broad ; inflorescence 4 cm. long ; anthers sessile and connate at the base, appendage subobtuse, connective emarginate or fimbriate where produced beyond the anthers ; ovary glabrous .. .. 21. *brachypetala*
Sepals glabrous or pubescent :
Flower-buds about 0·2 cm. long ; lamina generally 3 or more times as long as broad, cuneate at the base, main lateral nerves about 9 pairs ; staminal tube-lobes free ; connective not divided where produced beyond the anthers 22. *parviflora*
Flower-buds 0·3–0·4 cm. long ; lamina generally 2–2½ times as long as broad :
Lamina 20–30 cm. long, 6–8 cm. broad ; petioles 2–4 cm. long ; inflorescence to 12 cm. long ; sepals 0·3–0·4 cm. long ; petals to 0·6 cm. long ; lobes of staminal tube between the anthers or tube-margin irregular ; connective 2-fid where produced beyond the anthers ; fruit furfuraceous 23. *oblongifolia*
Lamina 20–35 cm. long, 9–14 cm. broad ; petioles 2–8 cm. long ; inflorescence to 20 cm. long ; sepals 0·2 cm. long and broad ; petals about 0·5 cm. long ; lobes of the staminal tube opposite the anthers ; connective not divided and only shortly produced beyond the anthers 24. *Preussii*
Petioles about 2 cm. long or less at least on the upper leaves :
Inflorescence about 4 cm. long or less at time of flowering :
Sepals 0·15 cm. long or less ; extremities glabrous or sometimes minutely pubescent ; lamina 10–19 cm. long, main lateral nerves 5–8 pairs, margin undulate or unequally serrate ; filaments glabrous ; ovary glabrous, not furfuraceous .. .. 25. *subintegrifolia*
Sepals 0·25–0·3 cm. long ; thecae apiculate, connective not otherwise produced ; lamina 5–10 cm. long, 3·5–5 cm. broad, main lateral nerves about 7 ; petiole 1–2 cm. long .. .. 26. *Whytei*
Inflorescence 5–10 cm. long :
Ovary furfuraceous or farinaceous externally ; petioles 0·5–1 cm. long ; lamina elliptic, generally somewhat cuneate at the base, 15–26 cm. long, 6–9 cm. broad ; inflorescence laxly paniculate ; bracts early deciduous ; bracteoles oblong, subobtuse, 0·1 cm. long .. .. 27. *dentata*
Ovary glabrous or pubescent :
Lobes of the staminal tube not free ; staminal appendage triangular, about as long as the thecae ; sepals oblong, pilose externally 28. *Poggei*
Lobes of the staminal tube free :
Appendage not half the length of the thecae ; lamina narrowly oblong, tapering into an acumen ; inflorescence laxly paniculate, flowers pendulous .. .. 29. *liberica*
Appendage longer than the diverging apiculate thecae ; lamina broadly elliptic, acuminate ; flowers somewhat crowded on the branches of the inflorescence .. .. 30. *microdon*

1. **Rinorea ilicifolia** *O. Ktze.* Revis. Gen. Pl. 42—Chev. Bot. 34 ; De Wild. in Bull. Jard. Bot. Brux. 6 : 166. *Alsodeia ilicifolia* Welw.—F.T.A. 1 : 108. A glabrous shrub, up to 12 ft. ; flowers yellowish-white. French Guinea : Kouria (Nov.) ! Sierra Leone : Sasseni ; Scarcies R. (Jan.) ! Ninia, Talla Hills (Feb.) ! Bafi River (Feb.) ! Ivory Coast : several localities (Dec., Jan., Mar., May). Also in Cameroons, Eastern Sudan, Uganda, East Africa and Angola. Exsicc.—*Sc. Elliot* 4427 ; 4868.

2. **Rinorea obanensis** *De Wild.* in Bull. Jard. Bot. Brux. 6 : 179 (1920). *Alsodeia obanensis* Bak. f. A small tree, up to 20 ft. high; petals yellow.
S. Nigeria: Oban! Exsicc.—*Talb.* 606.
3. **R. Bussei** *M. Brandt* in Engl. Bot. Jahrb. 51 : 125—De Wild. l.c. 155. A bush 1½ ft. high, with yellowish flowers.
Togo: Kpeta, 1,950 ft., in shady places (Nov.). Exsicc.—*Busse* 3358.
4. **R. kibbiensis** *Chipp* in Kew Bull. 1923 : 292. A tree, up to 20 ft. high, with whitish flowers; common as undergrowth.
Gold Coast: Kibbi Hills (Dec.)! Exsicc.—*Johnson* 507. (See Appendix).
5. **R. oblanceolata** *Chipp* l.c. 292. A shrub or bush.
Liberia: Begwai (Oct.). ? locality! Exsicc.—*Bunting* 21. *Cook* 177.
6. **R. Afzelii** *Engl.* Bot. Jahrb. 33 : 138—De Wild. l.c. 150, partly. A shrub.
Sierra Leone. Exsicc.—*Afzelius*.
7. **R. prasina** *Stapf* ex *M. Brandt.* in Engl. Bot. Jahrb. 50 : Suppl. 412. *Alsodeia prasina* Stapf 577. A glabrous shrub, with pale green serrate leaves.
Sierra Leone: Bathurst, 500 ft., by a stream (Feb.)! Liberia: near Monrovia! ? locality. Exsicc.—*Johnston* 91. *Whyte*. *Cook* 200.
8. **R. crassifolia** *De Wild.* in Bull. Jard. Bot. Brux. 6 : 158 (1920). *Alsodeia crassifolia* Bak. f. A shrub, 8–9 ft.; petals dull yellow.
S. Nigeria: Oban! Exsicc.—*Talb.* 1260.
9. **R. Johnstonii** *M. Brandt* in Engl. Bot. Jahrb. 50, Suppl. 414 (1914)—De Wild. l.c. 167. *Alsodeia Johnstonii* Stapf 577. A glabrous shrub with serrulate leaves; sepals dark, white-edged.
Liberia: Sinoe Basin! Grand Bassa! Exsicc.—*Whyte*. *Dinklage* 1944.
10. **R. Talbotii** *De Wild.* in Bull. Jard. Bot. Brux. 6 : 188 (1920). *Alsodeia Talbotii* Bak. f. A shrub, up to 6 ft. high.
S. Nigeria: Oban! Exsicc.—*Talb.* 478.
11. **R. punctata** *Chipp* in Kew Bull. 1923 : 293. A shrub, with pilose branches; inflorescence up to 12 cm. long.
S. Nigeria: Eket! Exsicc.—*Talb.* (no number).
12. **R. longicuspis** *Engl.* Bot. Jahrb. 33 : 137—De Wild. l.c. 172. A shrub or tree, up to 24 ft. high, with yellow flowers.
Gold Coast: Begoro (young fruits Mar.)! Also in Cameroons. Exsicc.—*Johnson* 695.
13. **R. Elliotii** *Engl.* l.c. 141—De Wild. l.c. 161. A shrub, up to 4 ft. high, with yellow flowers, common as undergrowth.
Sierra Leone: Kofiu Mt. (Jan.)! Kambui (Mar.)! Kennema (Mar.). Exsicc.—*Sc. Elliot* 4605.
14. **R. kamerunensis** *Engl.* l.c. 139—De Wild. l.c. 167. A shrub or undershrub in the forest.
S. Nigeria: between Victoria and Bimbia (April). Also in French Cameroons. Exsicc.—*Preuss* 1221 (not seen).
15. **R. arenicola** *M. Brandt* in Engl. Bot. Jahrb. 51 : 111—De Wild. l.c. 150. A bush or small tree, with yellow flowers.
Liberia: Grand Bassa, among bushes towards the sea front (fl. and young fr. Oct.). Exsicc.—*Dinklage* 1854.
16. **R. djalonensis** *A. Chev.* Bot. 34, name only. A shrub.
French Guinea: various localities! Exsicc.—*Chev.* 12845.
17. **R. brevivacemosa** *Chipp* l.c. 293. *Alsodeia latifolia*? Thouars—F.T.A. 1 : 107. A tree with densely pubescent branchlets.
Sierra Leone (May)! York Pass, by river banks in the forest (fr. June)! Exsicc.—*Barter* (no number). *Aylmer* 38; 53.
18. **R. Aylmeri** *Chipp* l.c. 294. A shrub with pilose branchlets.
Sierra Leone: Pujehun (April)! Kassewe (April). Yonibana (Nov.)! Exsicc.—*Aylmer* 63. *Thomas* 5166; 5185–6; 5272; 5279. (See Appendix).
19. **R. pilosa** *Chipp* l.c. 294. A shrub with glabrous branchlets and leaves; inflorescence terminal, up to 10 cm. long.
S. Nigeria: Oban! Exsicc.—*Talb.* (no number).
20. **R. rubrotincta** *Chipp* l.c. 294. A shrub, with pale terete branchlets pubescent when young; inflorescence densely pilose, up to 5 cm. long.
Liberia: Begwai, on old farmland (Oct.)! Exsicc.—*Bunting* 155.
21. **R. brachypetala** *O. Ktze.* Revis. Gen. Pl. 42, in part—De Wild. l.c. 153. *Alsodeia brachypetala* Turcz. —F.T.A. 1 : 109, in part. A shrub, 2–4 ft.; branchlets pubescent or nearly glabrous.
Sierra Leone: Yonibana (Nov.)! Liberia: ? locality! S. Nigeria: Lagos! Benin City! Ilaro (Jan.)! Also in Cameroons, Congo and Angola. Exsicc.—*Millen* 100. *Unwin* 30. *Thomas* 5164; 5187. *Cook* 58; 272; 331. (See Appendix).
22. **R. parviflora** *Chipp* l.c. 295. A glabrous shrub, with almost entire ovate to lanceolate leaves up to 22 cm. long and 8 cm. broad.
S. Nigeria: Oban! Also in Gabon. Exsicc.—*Talb.* 1391.
23. **R. oblongifolia** *Marquand* ex *Chipp* in Kew Bull. 1923 : 296. *Alsodeia Welwitschii* Oliv., in part—F.T.A. 1 : 110. A shrub or small tree, with glabrous or pubescent branchlets and elliptic or oblong leaves.
Senegal! Sierra Leone: York Pass (Dec.)! Kambia (Dec.)! Gold Coast: Larte (Oct.) Kumasi! S. Nigeria: Calabar! Cross River (April)! Oban! Cameroons River! Also in French Cameroons, Gabon and Eastern Sudan. Exsicc.—*Heudelot* 724. *Sc. Elliot* 4195; 4385; 5904. *Thomson* 100. (See Appendix).
24. **R. Preussii** *Engl.* l.c. 140—De Wild. l.c. 182. A tree with green glabrous branches.
S. Nigeria: Victoria, in the forest (Mar.)! Exsicc.—*Preuss* 1154.
25. **R. subintegrifolia** *O. Ktze.* l.c. 42—Chev. Bot. 34; De Wild. l.c. 187. *Alsodeia subintegrifolia*? P. Beauv.—F.T.A. 1 : 109. A shrub, 2–10 ft., common as undergrowth; flowers greenish-white or yellowish.
Senegal! French Guinea: several localities! Sierra Leone: Freetown! Regent (Dec.)! Kambia (Dec.)! Mabonto (Oct.)! Liberia: Monrovia! ? locality! Ivory Coast: several localities. S. Nigeria: Oware. Eket! Calabar! Cross River! Rio del Rey, in the forest! Also in French Cameroons and Angola. Exsicc.—*Heudelot* 694. *Sc. Elliot* 4159. *Chev.* 14745. *Thomson* 30. *Talb.* 3373. *Cook* 252. (See Appendix).
26. **R. Whytei** *M. Brandt* in Engl. Bot. Jahrb. 50 : Suppl. 418—*A. Chev.* Bot. 35. *Alsodeia Whytei* Stapf 578. A shrub with thin pale serrulate leaves; sepals pubescent.
Liberia: near Monrovia! Ivory Coast: several localities. Exsicc.—*Whyte*.
27. **R. dentata** *O. Ktze.* Revis. Gen. Pl. 42—De Wild. l.c. 159. *Alsodeia dentata* P. Beauv.—F.T.A. 1 : 110. A shrub, 8–10 ft. or more in height; petals yellow; sepals brown or purple.
Sierra Leone: Gorahun (Feb.)! Gold Coast: Axim (Dec.)! S. Nigeria: Ikirun (Feb.)! Lagos! Idu (Mar.)! Eket! Fernando Po (Dec.)! Also in Cameroons, Ubangi-Shari-Chad, Princes Island, Angola and Uganda. Exsicc.—*Mann* 90; 218. *Talb.* 3132. (See Appendix).
28. **R. Poggei** *Engl.* l.c. 137—De Wild. l.c. 181. A shrub; leaves stiff, obovate-lanceolate, narrowed from the upper ¼ to a cuneate base, shortly obtuse-acuminate, crenate or serrate, 5–7 cm. long, 2·5–4·5 cm. broad.
S. Nigeria: Oshogbo! Also in Cameroons, Congo and Uganda. Exsicc.—*Millson* 140. (See Appendix).
29. **R. liberica** *Engl.* l.c. 142—De Wild. l.c. 172. *Alsodeia liberica* Stapf 577. A shrub, with short terminal panicles of small yellowish-brown flowers.
Liberia: Grand Bassa, in forest near the coast (May); Sinoe Basin! Exsicc.—*Dinklage* 1944; *Whyte*.
30. **R. microdon** *M. Brandt* in Engl. Bot. Jahrb. 51 : 117—De Wild. l.c. 176. A shrub with white flowers.
French Guinea: ? locality! Liberia: Webbo (April). Exsicc.—*Farmar* 239.

FIG. 29.—HYBANTHUS ENNEASPERMUS *F. v. Muell.* (VIOLACEAE).

A, portion of stem with leaf and pedical. B, portion of leaf, under-surface. C, flower. D, lower petal. E, stamen, front view. F, stamen, side view. G, style. H, capsule open. I, valve of capsule from within. J, K, seeds.

FIG. 30.—VIOLA ABYSSINICA *Steud.* (VIOLACEAE).

A, portion of stem with stipules. B, sepal. C, D, lateral petals. E, stamen. F, stamen from behind. G, ovary with style. H, flower. I, longitudinal section of flower. J, capsule open.

2. HYBANTHUS Jacq.—F.T.A. 1 : 105, as *Ionidium* Vent.

Annual; stems and branches acutely angled; stipules linear, decurrent; leaves sometimes fasciculate, crowded, linear, acute, 1-nerved, 2–5 cm. long, up to 3–4 mm. broad, very remotely denticulate or subentire, glabrous or nearly so; pedicel about as long as the flower in bud; sepals linear-lanceolate, sharply keeled, setose on the keel and margins .. .. 1. *thesiifolius*

Perennial, suffruticose; stems slightly ribbed, glabrous or pubescent; stipules linear, slightly decurrent; leaves scattered, lanceolate or linear-lanceolate, acute, 4–7 cm. long, 0·5–1 cm. broad, remotely denticulate, with distinct lateral nerves; pedicel longer than the flower, 1 cm. or more; sepals not keeled, shortly setulose 2. *enneaspermus*

1. **H. thesiifolius** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *Ionidium thesiifolium* DC. and var. *chenopodioides* Guill. & Perr.—F.T.A. 1 : 106, under *I. enneaspermum*. *Viola guineensis* Schum. & Thonn. Erect, often much branched; flowers lilac or bluish.
Senegal: St. Louis! Walo! etc. (Dec., Jan.)! Gold Coast: Accra (Oct.)! Exsicc.—*Heudelot* (no number). *Roger* 146. *Brown* 409.

2. **H. enneaspermus** *F. v. Muell.* *Ionidium enneaspermum* Vent.—F.T.A. 1 : 105. *I. dahomense* and var. *maritimum* A. Chev. Bot. 33, names only. *Viola lanceifolia* Schum. & Thonn. Erect, simple, or often with numerous vertical branches from the base, up to 12–18 in. high. Flowers coloured as in the preceding.
French Sudan: Mossi (Aug.); Macina (Sept.). French Guinea: Pays de Guerzés (Mar.)! Ivory Coast: various localities! Gold Coast: Accra! Salaga! Dahomey: various localities, up to 1,500 ft. (Feb. to July). N. Nigeria: Abinsi (July)! Lokoja (July)! S. Nigeria: Onitsha! Abeokuta! Apapa (Mar.)! Lagos (Feb., Mar., May)! Oban! Extends to Angola, and to East and South Central Africa. Exsicc.—*Barter* 3350; 1637; 1807. *T. Vogel* (no numbers). *Farmar* 433.

3. VIOLA Linn.—F.T.A. 1 : 105.

Creeping; stems up to 2 ft. long, rooting at the nodes, glabrous; leaves ovate or ovate-orbicular, widely cordate at the base, subacute, 1·5–2·3 cm. long, 1–1·5 cm. broad, crenate, more or less sparingly setulose-pubescent on both surfaces, sometimes with dark-coloured scattered linear resinous bodies below; petiole shorter than the leaf; stipules foliaceous, deeply divided into lanceolate acute segments, nearly half as long as the petiole; flowers solitary on long slender pedicels bibracteate towards the apex; corolla purple; valves of capsule about 0·5 cm. long .. *abyssinica*

V. abyssinica *Steud.*—F.T.A. 1 : 105.
Cameroons Mt., 7,000 ft. (Jan.)! Fernando Po, 10,000 ft.! Also in the East African mts. from Abyssinia to the Transvaal. Exsicc.—*Mann* 297; 1331.

20. RESEDACEAE

Annual or perennial herbs with watery juice, rarely woody. Leaves alternate, simple or pinnately divided; stipules small, gland-like. Flowers mostly zygomorphic, hermaphrodite or rarely unisexual, racemose or spicate. Calyx persistent, mostly zygomorphic, 4–7-lobed, imbricate. Petals small and inconspicuous or none, valvate, free or slightly coherent, often laciniate, sometimes with a scale at the base. Disk present, often dilated on the adaxial side. Stamens 3–40, perigynous or on the disk, not covered by the petals in bud; filaments free or united at the base; anthers 2-celled, introrse. Ovary of 2–6 free or connate carpels, closed or gaping at the top, each carpel with a separate stigma; ovules numerous on parietal placentas or at the base of the ovary. Fruit a gaping capsule or baccate. Seeds numerous, kidney- or horse-shoe-shaped; endosperm absent; embryo curved or folded.

A small family represented in the northernmost part of our area by only one species. Recognised by the small flowers with much-divided petals, and parietal ovules.

RESEDA Linn.—F.T.A. 1 : 103.

Stems herbaceous, woody at the base, thinly villous-pilose; leaves deeply 3-lobed or simple, lobes linear-lanceolate, narrowed at the base, subacute, up to 10 cm. long and 2 cm. broad, thinly pilose; racemes up to 45 cm. long, rather dense-flowered; pedicels short; sepals 6; stamens about 40; fruits oblong, about 1 cm. long, slightly pilose on the sutures; seeds reniform, about 1 mm. long, very minutely and closely warted .. .. *villosa*

R. villosa *Coss.* in Bull. Soc. Bot. Fr. 6 : 392 (1859)—Chev. Bot. 33. *R. sudanica* A. Chev.
French Sudan: Timbuktu, near Gassa wells (Aug.)! Also in Morocco and Algeria. Exsicc.—*Cher.* 2521.

21. POLYGALACEAE

Herbs, shrubs, climbers or rarely small trees. Leaves alternate, rarely opposite, simple; stipules none. Flowers hermaphrodite, zygomorphic; pedicels often articulated. Sepals 5, free, imbricate, the two inner larger, often petaloid, wing-like. Petals 3–5, hypogynous, declinate, outer 2 free or united with the lowermost, upper 2 free or minute and scale-like or 0. Stamens 8, rarely 5 or 4, monadelphous beyond the middle or rarely free, the sheath split above, often adnate to the petals; anthers erect, 1–2-celled, opening by an apical pore, rarely 2-valved or opening nearly to the base. Torus small or rarely expanded into an annular disk within the stamens. Ovary free, 2-celled

FIG. 31.—CARPOLOBIA LUTEA *G. Don* (POLYGALACEAE).

A, flower. B, C, sepals. D, upper petal. E, the same with adnate stamen. F, staminal sheath with upper petal. G, 4 united stamens. H, ovary with style. I, fruit. J, seed. K, broader leaf.

or rarely 1-celled or 3–5-celled; style simple; ovules solitary in each cell, rarely more, pendulous. Fruit a capsule, samara or drupe. Seeds often pilose, with a conspicuous strophiole; endosperm mostly present; embryo straight.

Fairly abundantly represented in our area. Conspicuous by their zygomorphic flowers, often brightly coloured and resembling the *Papilionaceae*, but the ovary consisting of more than one carpel each with one or more pendulous ovules, and often pilose seeds with conspicuous strophiole.

Petals 5, subequal, united into a tube at the base; fruit drupaceous; stamens 5:
Fruit fleshy, yellow or red; seeds very densely villous, with copious fleshy endosperm **1. Carpolobia**
Fruit hard, crustaceous; seeds finely hairy, without endosperm .. **2. Atroxima**
Petals 3, the lateral ones free from the abaxial one (keel); shrubs or trees; fruit indehiscent, samaroid, 1-celled, 1-seeded; stamens 8 .. .. **3. Securidaca**
Petals 3, or the remainder minute, the lateral ones united with the abaxial one into a unilateral corolla, the middle petal often crested; usually herbaceous; fruit a compressed 2-celled capsule, dehiscing loculicidally at the edges; stamens 8 **4. Polygala**

1. CARPOLOBIA G. Don—F.T.A. 1 : 135.

Sepals very unequal, the inner much longer than the outer ; branchlets usually rather densely pubescent ; flowers about 1·5 cm. long :

Leaves distinctly subacutely acuminate, averaging about 7 cm. long and 2·5 cm. broad, oblong-elliptic .. .. 1. *alba*

Leaves obtuse, not or only slightly acuminate, averaging about 3·5 cm. long and 2 cm. broad, mostly rather ovate .. .. 2. *parvifolia*

Sepals subequal ; branchlets glabrescent or shortly pubescent ; leaves oblong-elliptic, acuminate :

Flowers about 1·5 cm. long ; sepals ovate or ovate-lanceolate, slightly ciliate 3. *glabrescens*

Flowers about 1 cm. long ; sepals lanceolate to ovate-lanceolate, distinctly ciliate and pubescent .. .. 4. *lutea*

1. **C. alba** *G. Don*—F.T.A. 1 : 135, partly and excl. var. ; Holl. 1 : 60 ; Chev. Bot. 43. A shrub, 8–10 ft., with white flowers.
Senegal ! French Guinea ! Sierra Leone : Freetown (Jan.) ! Liberia : ? locality ! Ivory Coast : several localities. Also in Ubangi-Shari-Chad and Uganda. Exsicc.—*Heudelot* 792. *G. Don* (no number). *Farmar* 193. *Cook* 55. (See Appendix).

2. **C. parvifolia** *Stapf* 578—Chev. Bot. 44. *C. alba* G. Don var. *parvifolia* Oliv.—F.T.A. 1 : 136. A shrub like the preceding.
Liberia : Monrovia ! ? locality ! Ivory Coast : several localities (July, Dec.). S. Nigeria : Calabar (Feb.) ! Oban ! Eket ! Exsicc.—*Talb.* 3193 ; 1404. *Mann* 2297. *Thomson* 65. *Cook* 513.

3. **C. glabrescens** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined : A shrub, about 10 ft. ; flowers yellowish-white.
S. Nigeria : Johann-Albrechtshöhe ! Fernando Po (Dec.) ! Extends through the Cameroons to Angola. Exsicc.—*Staudt* 460 ; 834. *Mann* 78.

4. **C. lutea** *G. Don*—F.T.A. 1 : 136 ; Holl. 1 : 60. Very similar to *C. alba* ; flowers white or yellowish.
Sierra Leone : Kambia (Dec.) ! Scarcies R. (Jan.) ! Lokko (April) ! Kamalu (Dec.) ! Kuntaia (Jan.) ! Liberia : ? locality ! Gold Coast : W. Apollonia (Aug.) ! Aburi (Nov.) ! Togo : Lome ! Dahomey : Porto Novo (Jan.) ! S. Nigeria : Lagos (Nov., Feb., Mar.) ! Epe ! Sapoba ! Abeokuta ! Ibadan ! Calabar (Feb.) ! Eket ! Oban ! Exsicc.—*Talb.* 3235. *Warnecke* 473. *Sc. Elliot* 4302 ; 4654 ; 5784. *Barter* 2149 ; 3263 ; 3354. *Mann* 2298. *Chev.* 22780. *Cook* 291.

2. ATROXIMA Stapf in Journ. Linn. Soc. 37 : 85.

Leaves rounded at the base, oblong-elliptic, subcaudate-acuminate at the apex, acumen oblique, 10–15 cm. long, 4–6 cm. broad, very closely and prominently reticulate on both surfaces ; racemes about 6 cm. long ; petiole about 5 mm. long .. .. 1. *liberica*

Leaves cuneate at the base, broadly elliptic, acuminate, acumen not oblique, 8–12 cm. long, 4–5·5 cm. broad, rather laxly but prominently reticulate on both surfaces ; racemes 3–4 cm. long ; petiole about 8 mm. long 2. *Afzeliana*

Leaves mostly cuneate at the base, elliptic, rather shortly and bluntly acuminate, acumen not oblique, 7–9 cm. long, 2·5–4 cm. broad, rather obscurely reticulate ; racemes 7–10 cm. long ; petiole about 8 mm. long 3. *macrostachya*

1. **A. liberica** *Stapf* in Journ. Linn. Soc. 37 : 85—Stapf 578, fig. 246 ; Chev. Bot. 44. A glabrous shrub or tree, 15 ft. or more in height.
Liberia : Sinoe Basin ! Ivory Coast : Bingerville (Feb.) ! Upper Sassandra (May) ! Also in Cameroons. Exsicc.—*Whyte* (no number). *Chev.* 17351.

2. **A. Afzeliana** *Stapf* l.c. 86—Chev. Bot. 44. *Carpolobia Afzeliana* Oliv.—F.T.A. 1 : 136, in obs. A glabrous shrub or tree up to 20 or 25 ft. in height ; flowers white or yellowish.
French Guinea : several localities ! Sierra Leone : ? locality ! Bumbuna (Oct.) ! Also in Cameroons. Exsicc.—*Smythe* 91. *Thomas* 3425 ; 3856 ; 3892. (See Appendix).

3. **A. macrostachya** *Stapf* l.c. 86. *Carpolobia macrostachya* Chodat. A glabrous shrub about 10 ft. high ; fruit edible.
French Guinea : between Ditun and Labé (April) ! Sierra Leone : Koflu, Scarcies R. (Jan.) ! Talla Hills (Feb.) ! Kabusa (April) ! Exsicc.—*Sc. Elliot* 4618 ; 4897 ; 5474. *Chev.* 12888. (See Appendix).

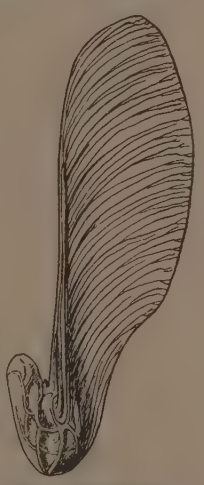

FIG. 32.—SECURIDACA WELWITSCHII *Oliv.* (POLYGALACEAE). Fruit.

3. SECURIDACA Linn.—F.T.A. 1 : 134.

Branchlets glabrous, or nearly so ; leaves broadly elliptic, shortly acuminate, 5–10 cm. long, 3–5·5 cm. broad, glossy above, glabrous below ; inflorescence branched ; fruit about 5–6·5 cm. long, the wing about 1·5–2 cm. broad, with a small second imperfect wing .. .. 1. *Welwitschii*

Branchlets softly pubescent ; leaves oblong-lanceolate, rounded at the apex, 2–5 cm. long, up to 2 cm. broad, very minutely pubescent on the lower surface ; inflorescence

a simple raceme ; fruit about 5 cm. long, the wing 1·5–2 cm. broad, sometimes with a very small second imperfect wing .. .. 2. *longipedunculata*

1. **Securidaca Welwitschii** *Oliv.*—F.T.A. 1 : 135. *S. timboensis* Pobéguin—Chev. Bot. 43. A shrub or lofty climber up to 80 ft. Flowers white, often pink at the base of the petals, or yellowish.
French Guinea : Bembaya (Feb.) ! S. Nigeria : Nun River (Sept.) ! Oban ! Cameroons R. (Jan.) ! Johann-Albrechtshöhe ! Also in French Cameroons and south to Angola and Uganda. Exsicc.—*Talb.* 1474. *Mann* 477 ; 2223. *Chev.* 20681.

2. **S. longipedunculata** *Fres.*—F.T.A. 1 : 134 ; Holl. 1 : 59 ; Chev. Bot. 43. A shrub or small tree up to 20 ft. high, with pale bark ; flowers red-purple, fragrant.
Common throughout the whole area, extending to S.W. Africa and the Transvaal.
The specimens from outside Upper Guinea have often the short lateral branchlets becoming spiny, and the wing of the fruit is usually rather abruptly narrowed into the base, but we can find no clear difference to separate them into two species. (See Appendix).

4. POLYGALA Linn.—F.T.A. 1 : 125 ; Chodat Monogr. Polygal. 1 (1891).

Very small slender annuals with minute flowers less than 3 mm. long ; roots very short ; leaves very small, linear ; fruits not winged ; lateral sepals persistent, faintly trinerved :
Pedicels nearly half as long as the flower ; lateral sepals broadly elliptic ; capsule oblong-ellipsoid ; seeds long-pilose .. .. 1. *Clarkeana*
Pedicels less than a quarter the length of the flower ; lateral sepals elliptic, acute ; capsule narrow ; seeds long-pilose .. .. 2. *Lecardii*
Pedicels about a quarter the length of the flower ; lateral sepals almost orbicular ; capsule suborbicular ; seeds shortly pubescent .. .. .. 3. *micrantha*
Larger herbs or undershrubs with flowers considerably over 3 mm. long :
Lateral sepals deciduous in fruit :
Stems herbaceous, slender, with scattered filiform leaves up to 3 cm. long ; inflorescence elongated, slender, simple, with scattered flowers ; pedicels about half the length of the flower, slender ; fruit widely bilobed .. .. 4. *guineensis*
Stems woody, densely leafy, the leaves mostly in clusters, acicular, up to 5 cm. long ; inflorescence dense, mostly branched ; pedicels very short and stout ; fruits deeply notched .. .. 5. *acicularis*
Lateral sepals persistent and often membranous in fruit :
Flowers in terminal slender racemes distinct from the leaves :
Keel-petal not cristate ; lateral sepals not hiding the fruit, with conspicuous coloured nerves ; leaves linear, acute, 3–5 cm. long, glabrous ; fruit oblong, widely bilobed, glabrous ; seeds long-pilose all over .. .. 6. *Volkensii*
Keel-petal cristate :
Stems deeply grooved, glabrous ; leaves usually few, linear, acute, up to 7 cm. long ; lateral sepals hiding the fruit and much longer, faintly veined ; fruit oblong-elliptic, narrowly bilobed at the apex ; seeds silky-pilose. 7. *rarifolia*
Stems not deeply grooved, mostly terete or angular ; leaves usually numerous :
Bracts deciduous ; leaves linear-oblanceolate, obtuse, up to 1·5 cm. long, puberulous ; lateral sepals becoming membranous ; fruits almost orbicular, distinctly winged ; seeds silky-pilose all over, penicillate at the end .. 8. *obtusata*
Bracts persistent :
Ovary and fruit glabrous on the margin, the latter narrowly winged towards the apex ; seeds glabrous except at the tips ; stems softly pubescent ; leaves up to about 12 cm. long, sessile ; lateral sepals large and membranous in fruit, reticulate ; fruit broadly elliptic, 8 mm. long .. .. 9. *butyracea*
Ovary and fruit ciliate on the margin, the latter not winged ; seeds pubescent or long-silky all over :
Ovary and fruit glabrous except on the margin :
Keel-petal very distinctly cristate ; flowers very shortly pedicellate, crowded ; leaves 6–20 cm. long, linear or lanceolate, almost glabrous ; pedicels pubescent .. .. 10. *Baikiei*
Keel petal minutely cristate ; leaves up to 6 cm. long ; flowers rather lax on the axis ; pedicels glabrescent .. .. 11. *multiflora*
Ovary and fruit hairy over the surface as well as the margin :
Leaves linear or linear-filiform, up to 3 cm. long ; flowers more or less scattered on the axis .. .. 12. *sparsiflora*
Leaves narrowly lanceolate-linear, up to 3 cm. long and 3 mm. broad ; flowers contiguous .. .. 13. *tenuicaulis*
Flowers in short axillary clusters or short racemes crowded amongst the leaves, the latter linear to lanceolate, obtuse or subobtuse, shortly pubescent, up to 2·5 cm. long ; lateral sepals pubescent ; fruits oblong-obovate, ciliate ; seeds narrow, long-pilose all over .. .. 14. *crioptera*
Flowers in dense terminal head-like racemes distinct from the leaves, the latter linear to oblanceolate, very variable, up to 7 cm. long and 1 cm. broad, slightly pubescent ; lateral sepals becoming whitish in fruit, pubescent ; fruits elliptic, glabrous ; seeds oblong, long-pilose all over .. .. .. 15. *arenaria*

1. **Polygala Clarkeana** *Chodat* in Bull. Herb. Boiss., Ser. 1, 4 : 235 (1896). *P. paludosa* Oliv., not of St. Hil.—F.T.A. 1 : 131; Chev. Bot. 41, An erect, branching or simple, glabrous herb, up to 25 or more cm. long; flowers white to lilac or pink.
French Guinea: several localities! Sierra Leone: Waterloo! Freetown! Kanya, 1,500 ft. (Oct.)! Exsicc.—*Burbridge* 141; 142. *Chev.* 18376.
2. **P. Lecardii** *Chodat* Monogr. Polygal. 222, t. 23, fig. 38–40 (1891). *P. pygmaea* A. Chev. Bot. 41. Habit as in the preceding.
Senegal. French Guinea: Kollangui (Mar.)! Futa Jallon (Sept.) Exsicc.—*Chev.* 12226; 18420; 18440; 18463; 18555.
3. **P. micrantha** *Guill. & Perr.*—F.T.A. 1 : 131; Chodat Monogr. Polygal. 217. Habit as in the preceding.
Senegal! French Guinea: Kouroussa! N. Nigeria: Bauchi Plateau, 3,000–4,600 ft. (July)! Abinsi! Also in Ubangi-Shari-Chad and Gabon. Exsicc.—*Perrottet* (no number). *Dalz.* 786. *Lely* 355. (See Appendix).
4. **P. guineensis** *Willd.*—F.T.A. 1 : 132; Chodat l.c. 371; Chev. Bot. 40. An erect glabrous annual, forking, with striate stem, up to 2 or 3 ft. high; flowers rather small, up to 4–5 mm. long, greenish-yellow to red.
Ivory Coast: Baoulé-Nord, Mt. Kangoroma (July)! Gold Coast: Accra (June)! Akuse (June)! Togo: near Lome! N. Nigeria: Nupe! Exsicc.—*Warnecke* 225. *Barter* 1556.

FIG. 33.—POLYGALA ARENARIA *Willd.* (POLYGALACEAE).

A, portion of stem showing curved hairs. B, flower. C, longitudinal section of flower. D, E, outer sepals. F, wing sepal. G, lateral petal. H, staminal sheath. I, anther with terminal pore. J, longitudinal section of ovary. K, ovule. L, seed.

5. **P. acicularis** *Oliv.*—F.T.A. 1 : 132; Chodat Monogr. Polygal. 368. A low glabrous shrub, about 2 ft. high, with stout rigid branches; flowers 6–8 mm. long, whitish to blue-purple.
N. Nigeria: Lokoja (Sept., Oct.)! Bennett Mts.! Bauchi Plateau, 4,600 ft. (July)! Extends to Cameroons, Ubangi-Shari-Chad, Congo, Angola and Uganda. Exsicc.—*Barter* 567.
6. **P. Volkensii** *Guerke* in Engl. Pflanzenwelt Ost-Afr. C. 234 (1895). *P. triquetra* A. Chev. Bot. 42. Erect, simple or sparingly branched with long slender branches, 2–3 ft. high; flowers 4–5 m. long; keel-petal purple.
Dahomey: Atacora Mts., 1,500–1,600 ft. (June). N. Nigeria: Zungeru (Aug.)! Sokoto (July)! Bauchi Plateau (June, Aug.)! Also in East Africa, Nyasaland and Rhodesia. Exsicc.—*Dalz.* 60; 569. *Lely* 275; 472. *Dent Young* 12. *Chev.* 24041.
7. **P. rarifolia** *DC.*—F.T.A. 1 : 132; Chodat l.c. 367; Chev. Bot. 41. Erect, with slender glabrous branches, sometimes reaching 8–9 ft. in height; flowers whitish to purple.
French Guinea: several localities! Sierra Leone: several localities (July to Dec.)! Exsicc.—*Heudelot* 641. *Sc. Elliot* 4049a. *Farmar* 175. *Thomas* 998; 1086; 1582. *Pobéguin* 777.
8. **P. obtusata** *DC.*—F.T.A. 1 : 129, under *P. triflora* Linn. *P. irregularis* Boiss.—F.T.A. 1 : 131; Chev. Bot. 41. Suffrutescent, with wiry branches, 1½–2 ft. high, in sandy places, flowering at all seasons.
French Sudan: Timbuktu (July). Senegal! Extending to the Eastern Sudan and Arabia. Exsicc.—*Thierry* 134. *Richard. Chev.* 1280.

9. **Polygala butyracea** *Heckel* in Bull. Soc. Géogr. Marseille 13 : 222 (1889)—Chodat Monogr. Polygal. 333 ; Oliv. in Hook. Ic. Pl. t. 2301 ; Chev. Bot. 40. Perennial, with long branches, 4–6 ft. high ; flowers 7–10 cm. long, white, pink or yellowish.
Senegal. French Guinea. Sierra Leone : Kitchom (Dec.) ! N. Nigeria : several localities ! Also in Somaliland. Exsicc.—*Sc. Elliot* 4072. *Dalz.* 726. *Yates* 28. (See Appendix).
10. **P. Baikiei** *Chodat* Monogr. Polygal. 334. Annual, with branches sometimes up to 5 ft. ; flowers pink or red, 6–7 mm. long.
French Sudan : Ouagadougou (Aug.). Sierra Leone : Jigaya (Sept.) ! Fundembaia (Oct.) ! Gold Coast : Kintamps ! N. Nigeria : Bauchi Plateau 3,000–4,500 ft. (Aug.) ! Abinsi (Sept.) ! Lokoja ! Nupe ! Ilorin (Oct.) ! S. Nigeria : Lagos Colony (Sept.) ! Exsicc.—*Barter* 564 ; 782 . *Thomas* 2564.
11. **P. multiflora** *Poir.*—F.T.A. 1 : 127. *P. senegambica* Chodat—Chev. Bot. 41, incl. vars. An erect undershrub, 2–3 ft. high, slightly pubescent or puberulous ; flowers 6–7 mm. long, pink-purple, distinctly pedicellate.
French Sudan : Koulikoro (Oct.) ! Senegal : Dioubéba (Dec.). French Guinea : various localities ! Sierra Leone : Leicester Peak (Dec.) ! Jigaya, 1,100 ft. (Sept.) ! Kaballa, 1,200 ft. (Sept.) ! Mamaha (Nov.) ! Dandafarra (Jan.). Ivory Coast : various localities ! N. Nigeria : Bauchi Plateau ! Exsicc.—*Sc. Elliot* 3856. *Thomas* 2184 ; 2495 ; 2575 ; 4662. *Chev.* 2529 ; 24869 ; 21627 ; 22289.
12. **P. sparsiflora** *Oliv.*—F.T.A. 1 : 127. *P. djalonis* A. Chev. Bot. 40. Erect annual, simple or branched, 2–4 ft. high ; flowers 6–7 mm. long, greenish-white or pink.
French Guinea : Futa Jallon (Sept.) ! Sierra Leone : Waterloo (Oct.) ! Moyamba (Aug.) ! Kanike (Sept.). Exsicc.—*Morson. Lane-Poole* 407. *Dawe* 561. *Chev.* 18641.
13. **P. tenuicaulis** *Hook. f.*—F.T.A. 1 : 127 ; Chodat Monogr. Polygal. 335. An erect annual, usually branched, pubescent, 1–2 or more ft. high ; flowers about 6 mm. long, pink or purplish.
Cameroons Mt., 7,000 ft. (Nov., Dec.) ! Exsicc.—*Mann* 1982 ; 1282.
14. **P. erioptera** *DC.*—Chodat l.c. 342 ; Chev. Bot. 40. *P. triflora* Oliv.—F.T.A. 1 : 128, partly, not of Linn. An annual, erect, 1–2 ft. high, or diffuse and much branched, pubescent ; flowers about 5 mm. long ; petals pink-tipped.
Widely distributed from Cape Verde to Egypt and Abyssinia, also in Arabia and Socotra, Angola, Nyasaland, etc. Exsicc.—*Perrottet* 28. *E. Vogel* 4.
15. **P. arenaria** *Willd.*—F.T.A. 1 : 128 ; Chodat l.c. 337 ; Chev. Bot. 39. An annual, erect or diffuse and much branched, from a few inches to a foot or more in height ; lateral petals yellowish, keel-petal pink to purple.
Widely distributed over the whole area, and extending to East Africa, Rhodesia, etc. Exsicc.—*T. Vogel* 175. *Barter* 429 ; 1555 ; 1804. *Baikie* 5. *Elliott* 17. (See Appendix).

22. CRASSULACEAE

Herbs and undershrubs, usually succulent ; leaves opposite or alternate, exstipulate. Flowers actinomorphic, hermaphrodite, usually cymose. Sepals free or united into a tube, often 4 or 5. Petals the same number as the sepals, free or variously connate, hypogynous. Stamens as many or twice as many as the petals, if few then alternate with the petals, slightly perigynous ; filaments free ; anthers 2-celled, introrse, dehiscing longitudinally. Hypogynous scales present within the stamens. Carpels superior, the same number as the petals, free or united at the base, 1-celled ; ovules many or rarely few, inserted on the adaxial suture ; styles short or elongated. Fruit follicular, membranous or leathery, often surrounded by the persistent membranous corolla, opening on the adaxial side. Seeds mostly minute, usually with fleshy endosperm ; embryo straight.

Widely distributed in temperate and tropical regions, especially in mountainous districts, rare in South America and Australasia. Easily recognised by the succulent habit and often opposite leaves, the cymose slightly perigynous flowers, the definite number of stamens, the more or less free carpels and numerous minute seeds.

Flowers small or medium-sized, axillary or corymbose ; petals free or slightly united at the base ; stamens the same number as the petals .. .. **1. Crassula**
Flowers usually fairly large ; petals united beyond the middle into a tube ; stamens twice the number of the petals :
Calyx nearly as long as the corolla, becoming inflated and membranous, about 3 cm. long ; flowers few in a lax panicle, drooping .. .. .. **2. Bryophyllum**
Calyx much shorter than the corolla, and neither inflated nor becoming membranous ; flowers numerous in cymes or racemes ; corolla becoming membranous and surrounding the carpels :
Leaves opposite, not peltate ; inflorescence cymose ; sepals 4 .. **3. Kalanchoe**
Lower leaves peltate, orbicular, alternate ; inflorescence a simple raceme, rarely with a few basal branches ; sepals 5 .. .. **4. Umbilicus**

1. CRASSULA Linn.—F.T.A. 2 : 388, incl. *Tillaea* Linn.

Flowers very small, axillary ; stems not or slightly succulent, usually with very crowded leaves :
Leaves broadly ovate, subacute, abruptly narrowed into the claw-like base, 1–1·5 cm. long, 6–8 mm. broad ; pedicels about 6 mm. long ; stems with a longitudinal line of hairs .. .. **1. *alsinoides***
Leaves lanceolate, acute, about 7 mm. long, broadened towards the base ; flowers sessile ; stems angular, nearly glabrous .. .. **2. *pentandra***

Leaves linear-subulate, very acute, 3–4 mm. long; flowers pedicellate on very short axillary branchlets; stems flattened, glabrous .. .. .. 3. *pharnaceoides*
Flowers medium-sized, in dense terminal corymbose cymes; stems and leaves fleshy, the latter few, the basal ones linear-lanceolate, acute, sheathing at the base, up to about 10 cm. long and 1 cm. broad, the cauline ovate-lanceolate, with short broad papillae on the margin; cymes up to 10 cm. in diam. .. .. .. 4. *Mannii*

FIG. 34.—KALANCHOE CRENATA *Haw.* (CRASSULACEAE).
A, flower. B, the same in longitudinal section showing all the stamens.

1. **Crassula alsinoides** *Engl.* in Abh. Preuss. Akad. Wiss. 1892 : 231. *Tillaea alsinoides* Hook. f.—F.T.A. 2 : 387. Corolla white.
Fernando Po, 7,500 ft.! Also in East and S.E. Africa. Exsicc.—*Mann* 1450.
2. **C. pentandra** *Schoenl.* in Engl. & Prantl Nat. Pflanzenfam. 3, 2 : 37 (1891). *Tillaea pentandra* Royle—F.T.A. 2 : 386.
Cameroons Mt., 8,000 ft. (Nov.)! Also in the East African mts. and Angola, and in India. Exsicc.—*Mann* 2037.

3. **Crassula pharnaceoides** *Schoenl.* l.c. Cameroons Mt., 9,000 ft. (Nov.)! —*Mann* 1991. *Tillaea pharnaceoides* Hochst.—F.T.A. 2 : 387. Also in the East African mts., S. Africa and N.W. Himalaya. Exsicc.

4. **C. Mannii** *Hook. f.* in Journ. Linn. Soc. 7 : 193. *C. abyssinica* Britten—F.T.A. 2 : 388, partly, not of A. Rich.
Cameroons Mt., 6,000–12,000 ft. (Nov.–Dec.)! Exsicc.—*Mann* 1304; 2036.

FIG. 35.—UMBILICUS BOTRYOIDES *Hochst.* (CRASSULACEAE).
A, flower. B, corolla laid open. C, carpels and hypogynous scales. D, one of the scales.

2. BRYOPHYLLUM Salisb.—F.T.A. 2 : 389.

A fleshy shrub 2–4 ft. high, branched from the base ; leaves opposite, simple or trifoliolate, petiolate, obovate to obovate-orbicular, about 10 cm. long and 5–6 cm. broad, coarsely crenate, sometimes the teeth bearing bulbils in their axils, glabrous ; flowers drooping, in lax panicles ; calyx inflated, tubular, 4-lobed, 3 cm. long, greenish-yellow

and purplish at the base, lobes triangular, very acute ; corolla gamopetalous, tubular, contracted above the base, a little longer than the calyx, 4-lobed, reddish-purple in the upper part ; lobes ovate-lanceolate, abruptly acute-acuminate ; stamens 8, a little exserted .. .. *pinnatum*

Bryophyllum pinnatum *S. Kurz* in Journ. As. Soc. Beng. 40 (1871) 2 : 52. *B. calycinum* Salisb.—F.T.A. 2 : 390 ; Stapf 602 ; Chev. Bot. 254. *Kalanchoe pinnata* Pers.

Probably introduced from Madagascar or tropical Asia, and now naturalised in the coast and forest districts throughout the area. (See Appendix).

3. KALANCHOE Linn.—F.T.A. 2 : 390.

Stems, pedicels and calyx quite glabrous ; calyx divided to the base, segments linear-lanceolate, acutely acuminate, 5–6 mm. long ; corolla-lobes ovate-lanceolate, acute 1. *Petitiana*

Stems, pedicels or calyx pubescent or glandular-pilose :

Calyx divided to or nearly to the base ; stems not angular :

Flowers yellow or orange ; corolla-lobes broadly ovate and very abruptly apiculate ; sepals lanceolate, acute, 5–6 mm. long, clothed with short gland-tipped hairs 2. *crenata*

Flowers scarlet ; corolla-lobes narrower and gradually acuminate ; sepals narrowly lanceolate, acute, about 6 mm. long, densely glandular-pubescent 3. *coccinea*

Calyx lobed hardly down to the middle, the lobes triangular, acute, densely glandular-pilose ; branches of the inflorescence crowded, usually with the flowers borne to one side ; stems more or less quadrangular .. .. .. 4. *lanceolata*

1. **K. Petitiana** *A. Rich.* Tent. Fl. Abyss. 1 : 311. *K. crenata* Britten—F.T.A. 2 : 394, partly, not of Haw. Herbaceous, 4–6 ft. high ; flowers yellow.
S. Nigeria : Oban ! Cameroons Mt., 3,000–7,000 ft. (Dec., Jan.) ! Also in Abyssinia and Kenya Colony. Exsicc.—*Mann* 1315 ; 2038. *Talb.* (no number).
2. **K. crenata** *Haw.*—F.T.A. 2 : 394, partly ; Chev. Bot. 254. *K. brasiliensis* Cambr. *K. brachycalyx* A. Chev., not of A. Rich. Like the preceding.
French Sudan : Gourma (July) ! French Guinea : Follo (Dec.) ; Mamou (Jan.). Sierra Leone : Leicester Peak (Dec.) ! and other localities ! Ivory Coast : Bingerville (Dec.). Gold Coast : Aburi (May) ! S. Nigeria : Lagos Colony ! Lagos (Jan.) ! Cross River (Dec.) ! Exsicc.—*Winwood Reade. Sc. Elliot* 3883. *Johnson* 31. *Chev.* 24425. (See Appendix).
3. **K. coccinea** *Welw.*—F.T.A. 2 : 395. Stem 2–4 ft., glabrous below, glandular-hispid above.
N. Nigeria : Bauchi Plateau ! Also in Cameroons, Congo and Angola ; introduced into the Bahamas. Exsicc.—*Dent Young* 90.
4. **K. lanceolata** *Pers.* Syn. 1 : 446. *K. glandulosa* Hochst.—F.T.A. 2 : 396. *K. laciniata* Britten—F.T.A. 2 : 392, not of DC. *K. brachycalyx* Britten—F.T.A. 2 : 396, partly, not of A. Rich. *K. Ellacombei* N.E. Br. *K. crenata* Haw. var. *collina* Engl. *K. rosea* A. Chev. Bot. 254 ? A herb, 18 in. high, amongst rocks ; flowers yellow to salmon-pink.
French Sudan : Balani, amongst rocks (Jan.) ! N. Nigeria : Jebba ! Naraguta (Nov.)! Extends to Abyssinia, Angola and Rhodesia. Exsicc.—*Barter* 1216 ; 1764. *Lely* 700. *Chev.* 149.

4. UMBILICUS DC.—F.T.A. 2 : 398, under *Cotyledon* Linn.

An erect, simple or slightly branched, glabrous fleshy herb, up to about 1 ft. high ; lower leaves peltate, long-petiolate, orbicular, slightly crenate, 3–4 cm. in diameter, the upper ones more or less basifixed and more shortly petiolate ; bracts often foliaceous and then larger than the flowers ; pedicels about 3 mm. long ; sepals ovate-triangular, acute, about 2 mm. long ; corolla ellipsoid, about 7 mm. long *botryoides*

U. botryoides *Hochst.* ex *A. Rich.* Tent. Fl. Abyss. 1 : 308. *Cotyledon Umbilicus* Britten—F.T.A. 2 : 398, not of Linn.
Cameroons Mt., 7,000–10,000 ft. (Nov., Jan.) ! Also in the mountains of Abyssinia and Uganda. Exsicc. —*Mann* 1286 ; 2035.
Formerly identified with the Western European *U. pendulinus* DC., but differing in its shorter pedicels, short and broad sepals and more globular corolla.

23. SAXIFRAGACEAE

Herbs, not or slightly succulent. Leaves usually alternate (opposite in *Vahlia*), exstipulate. Flowers actinomorphic, hermaphrodite, rarely solitary. Sepals usually 5, imbricate or valvate. Petals alternate with the sepals or absent, often clawed, perigynous or rarely epigynous. Stamens inserted with the petals, 5–10 ; filaments free ; anthers 2-celled, dehiscing longitudinally. Ovary 1–5-celled, free or adnate to the receptacle ; styles usually free ; ovules numerous, on axile or parietal placentas or the latter pendulous from the apex of the cells. Fruit a capsule. Seeds usually numerous, small, with endosperm ; embryo minute, straight.

Widely distributed in temperate regions, rare in the tropics. Represented in our area by the single genus *Vahlia*, which is remarkable in the family in having opposite leaves and the placentas pendulous from the top of the ovary. This genus is liable to be mistaken for *Oldenlandia* (*Rubiaceae*), which has interpetiolar stipules, united petals and axile placentas.

VAHLIA Thunb.—F.T.A. 2 : 383.

Herbs with opposite exstipulate ovate to linear leaves, often glandular. Flowers paired, axillary, subsessile or pedunculate. Sepals 5, valvate. Petals 5, scarcely exceeding the sepals. Stamens 5. Ovary inferior, 1-celled, with 2 pendulous many-ovuled placentas. Capsule dehiscing at the apex.

Plant very viscous with gland-tipped hairs ; leaves ovate or ovate-lanceolate, rarely linear-lanceolate ; flowers subsessile, in axillary pairs or solitary ; calyx-lobes ovate, about as long as the tube ; filaments filiform, ciliate, with a small hairy appendage at the base ; styles as long as the calyx-lobes .. .. .. 1. *viscosa*

FIG. 36.—VAHLIA OLDENLANDIOIDES *Roxb.* (SAXIFRAGACEAE).

A, leaf. B, flower. C, the same open. D, longitudinal section of flower showing pendulous placentas. E, the same showing the face of a placenta. F, stamen. G, the same from behind.

Plant not or slightly viscous ; leaves linear ; flowers paired on axillary peduncles ; calyx-lobes lanceolate or ovate-lanceolate, shorter than the tube at least in fruit ; filaments about twice as long as the anthers, not ciliate and not appendaged ; styles rather short, stout and divaricate .. .. 2. *oldenlandioides*

1. **V. viscosa** *Roxb.*—F.T.A. 2 : 383. A herb in sandy river beds and swampy meadows.
Senegal ! N. Nigeria : Sokoto (Dec.) ! Yola (Dec.) ! Kuka (Jan.) ! Also in Egypt and eastwards to India. Exsicc.—*Roger*. *E. Vogel* 5. *Dalz.* 50. *Moiser* 189.

2. **V. oldenlandioides** *Roxb.*—F.T.A. 2 : 384. A herb in damp fields, etc., much resembling an *Oldenlandia*.
Senegal : St. Mary Island ! Dakar ! Togo : Lome ! N. Nigeria : Borgu ! Sokoto (Oct.–Nov.) ! Bauchi Plateau, 3,200 ft. (May) ! Bornu (April) ! Also in East Africa, Madagascar, and in tropical Asia. Exsicc.—*Brunner* 145. *Warnecke* 153. *Barter* 725. *E. Vogel* 87. *Dalz.* 441.

24. DROSERACEAE

Herbs, often stemless with rosettes of leaves, the latter usually covered with sticky stipitate glands which entrap insects. Flowers actinomorphic, hermaphrodite, in usually simple circinate cymes. Sepals 5–4, more or less connate at the base, imbricate, persistent. Petals 5, hypogynous, very rarely perigynous, nervose. Stamens 4–20, often 5, hypogynous, free or rarely united at the base; anthers 2-celled, extrorse, opening by longitudinal slits. Ovary free, 1-celled, with parietal or subbasal placentas; ovules many or rarely few; styles 3–5, mostly free. Fruit a loculicidal capsule. Seeds numerous, with fleshy endosperm; embryo straight; cotyledons short.

A small family generally found in swampy or sandy situations in tropical and temperate regions of both hemispheres; not found in rain-forest areas. Easily recognised by the herbaceous habit and the stipitate-glandular leaves which entrap insects, the smallish fugacious flowers, and the syncarpous ovary with parietal placentas.

DROSERA Linn.—F.T.A. 2 : 401; Diels in Engl. Pflanzenr. Droseraceae (1906).

Herbs with sticky glandular hairs. Sepals and petals 5 (rarely 4–8). Stamens the same number as the petals, and alternating with them. Placentas 3–5.

Leaves spathulate; stipules broad, pectinate, persistent, scarious; pedicels up to 3 mm. long in fruit 1. *madagascariensis*

Leaves narrowly linear; stipules setiform or obsolete; pedicels up to about 1 cm. long in fruit .. .. 2. *indica*

FIG. 37.—DROSERA MADAGASCARIENSIS *DC.* (DROSERACEAE).½

A, portion of stem. A1, stipule. B, leaf. C, portion of raceme enlarged. D, petal. E, stamen, front and back. F, gland-tipped hair of leaf. G, fruit.

1. **D. madagascariensis** *DC.*—Diels in Engl. Pflanzenr. Droserac. 98. *D. ramentacea* Oliv.—F.T.A. 2 : 403, not of Burch.; Chev. Bot. 255. Flowers pink.
French Sudan: Sikasso (May); Folo (May). N. Nigeria: Kontagora (Nov.)! Nupe! Bauchi Plateau! Yola! Also in Ubangi-Shari-Chad, Angola, Uganda and Nyasaland, S.E. Africa and Madagascar. Exsicc. —*Barter* 1332.

2. **Drosera indica** *Linn.*—F.T.A. 2 : 402 ; Chev. Bot. 254. Flowers pink, mauve or white.
French Sudan : Koulikoro (Oct.) ! Senegal : Casamance (Jan., Feb.). Gambia ! Sierra Leone : Waterloo, etc. (Oct., Dec.) ! Ivory Coast : Touminiané (Aug.). N. Nigeria : Bauchi Plateau (Aug.) ! Zungeru (Sept.) ! Nupe ! Lokoja (Oct., Nov.) ! Also in other parts of the Old World Tropics. Exsicc.—*Barter* 1331. According to Planchon (Ann. Sci. Nat., ser. 3, 9 : 190), *D. Burmannii* Vahl was collected at Sierra Leone by Afzelius. This species is distributed from the Indian Peninsula to South Japan and North Australia, and this record is probably an error. Diels in his monograph (l.c.) makes no mention of it from Africa.

25. PODOSTEMONACEAE

Submerged fresh-water herbs often resembling mosses, hepaticae and algae. Flowers small, solitary or cymose, actinomorphic, hermaphrodite, often enclosed when young in a spathe. Sepals 2–3, usually small, connate in the lower part. Petals absent. Stamens 1–4, hypogynous ; filaments free or partially united ; anthers 2-celled, opening lengthwise. Ovary sessile or stipitate, superior, 1–3-celled with axile placentas ; styles 2–3, slender ; ovules numerous. Fruit a capsule, opening by valves. Seeds minute, without endosperm.

Mostly in the tropics and subtropics of the Southern Hemisphere. Recognised by the submerged aquatic habit, small inconspicuous flowers without petals often enclosed when young in a spathe, the few stamens, and absence of endosperm.

Sepals 3 ; leaves entire ; stamen 1 ; fruit 3-valved, valves nerved **1. Tristicha**
Sepals 2 ; leaves deeply divided ; stamens 2 ; fruit 2-valved, valves strongly ribbed **2. Dicraea**

1. TRISTICHA Thouars—F.T.A. 6, 1 : 121.

A submerged moss-like aquatic herb attached to rocks ; leaves very small, ovate to lanceolate, acute, keeled ; flowers terminal on very short leafy branchlets towards the apex of the stem ; pedicels slender, up to 1·5 cm. long ; sepals oblong-lanceolate, pellucid ; ovary shortly stalked ; capsule ellipsoid, with longitudinal nerves, about 1·5 mm. long, dry and submembranous .. .. *hypnoides*

T. hypnoides *Spreng.*—F.T.A. 6, 1 : 121 ; Chev. Bot. 539. On rocks submerged during the rains.
French Sudan : Chute de Billy (Dec.) ; Baoulé (April). N. Nigeria : Nupe, R. Niger and tributaries ! Nassarawa, Randa ! Fernando Po : in a rivulet near Clarence ! Extends to Angola, Eastern Sudan, Abyssinia, and to S.E. Africa. Exsicc.—*Barter* 1093 ; 1530 ; 2073.

2. DICRAEA Thouars—F.T.A. 6, 1 : 125

A dwarf moss-like herb ; leaves deeply and irregularly divided, about 2 mm. long ; flowers at first inflexed within the partially connate involucrate bracts ; peduncle up to 3-flowered and 1·5 cm. long ; pedicels about 3 mm. long ; sepals linear ; capsule ellipsoid, nearly 2 mm. long, very strongly ribbed .. .. .. *Garrettii*

D. Garrettii *C. H. Wright*—F.T.A. 6, 1 : 126 ; Chev. Bot. 539.
French Guinea : Grandes Chutes (Dec.). Sierra Leone : Sherbro ! Exsicc.—*Garrett. Chev.* 20231 (not seen).

26. ELATINACEAE

Herbs or low shrubs. Leaves opposite or verticillate, simple ; stipules present, paired. Flowers small, actinomorphic, hermaphrodite, axillary, solitary or cymose. Sepals 3–5, free, imbricate. Petals as many, hypogynous, imbricate, persistent. Stamens from as many to twice as many as the petals, free, hypogynous ; anthers 2-celled, opening by longitudinal slits. Ovary superior, 3–5-celled ; placentation axile ; styles 3–5, free ; ovules numerous. Fruit a septicidal capsule. Seeds without endosperm, straight or curved ; embryo with short cotyledons.

Widely spread in the warmer parts of the world. Resembling *Caryophyllaceae* and *Lythraceae*, but differing from the former by the several-celled ovary and the absence of endosperm, from the latter by the free imbricate sepals and the erect anthers in bud.

BERGIA Linn.—F.T.A. 1 : 152.

Sepals usually 5, membranous on the margin. Petals often smaller. Ovary narrowed to the apex. Leaves serrate or entire ; stipules fairly large. Seeds smooth, more or less oblong.

Shrubby ; sepals acutely acuminate, 4–5 mm. long ; leaves pseudoverticillate, the larger ones elliptic, narrowed into a short petiole, up to 3 cm. long and 1 cm. broad, closely serrate, scabrid-pubescent ; flowers white or tinged with rose .. 1. *guineensis*

Herbaceous; sepals at most 1·5 mm. long; leaves paired, oblanceolate to linear-oblanceolate; petals smaller than the sepals:
Stipules rather coarsely toothed; stamens 5–12; leaves rather obscurely toothed, distinctly petiolate, oblanceolate; flowers white .. .. .. 2. *peploides*
Stipules merely ciliate; leaves distinctly toothed:
Stamens 10; flowers red; leaves gradually narrowed into a fairly long petiole, linear-oblanceolate .. .. 3. *erecta*
Stamens 5; flowers white; leaves shortly petiolate, obovate-oblanceolate 4. *pentandra*

1. **Bergia guineensis** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *B. suffruticosa* Oliv.—F.T.A. 1: 153, not of Fenzl: Chev. Bot. 49. *Talinum crassifolium* A. Chev. Bot. 48, not of Willd. *Lancretia suffruticosa* Guill. & Perr. Tent. Fl. Seneg. 108, not of Del. A heath-like undershrub, often covering large patches of ground; flowers with stamens and ovary often pink, frequented by bees.
Mauritania: Dikel (Dec.). French Sudan: Djenne (June)! Timbuktu (July); Mossi (July). Senegal (Feb.)! Ivory Coast: Assikasso! N. Nigeria: Sokoto (Dec.)! Hadeija (Feb.)! Katagum (July)! Kuka (Jan.)! Exsicc.—*Leprieur* 47. *Heudelot. E. Vogel* 14. *Dalz.* 190. *Chev.* 1134; 22577. (See Appendix).

FIG. 38.—BERGIA GUINEENSIS *Hutch. & J. M. Dalz.* (ELATINACEAE).
A, open flower. B, flower not fully opened. C, sepal from within. D, petal. E, F, stamen of outer row, front and back. G, H, stamen of inner row. I, ovary. J, cross-section of ovary. K, capsule separating into valves. L, seed. M, portion of stem showing leaf-bases and stipules.

2. **B. peploides** *Guill. & Perr.* Tent. Fl. Seneg. 44. *B. ammannioides* Oliv., in part, not of Roxb. A herb of wet meadows, about 6 in. high.
Senegal: Walo, etc. (Nov., Dec.)! Exsicc.—*Perrottet.*
3. **B. erecta** *Guill. & Perr.* l.c. 43. *B. ammannioides* Oliv., in part, not of Roxb. An erect herb of alluvial flats, etc., 6–10 in. high.
Senegal: Walo (April)! Exsicc.—*Leprieur.*
4. **B. pentandra** *Guill. & Perr.* l.c. 42, t. 12. *B. ammannioides* Oliv., in part, not of Roxb. A prostrate or ascending branched herb of dry sandy places.
Senegal: Walo (Feb., Mar.)! Exsicc.—*Guillemin. Perrottet. Heudelot.*

27. CARYOPHYLLACEAE

Herbs, annual or perennial; leaves opposite, simple, often connected at the base by a transverse line; stipules absent or if present often scarious. Flowers actinomorphic, mostly hermaphrodite, solitary or in cymes. Sepals free or united into a tube, imbricate, often with membranous margins. Petals as many as the sepals, often small or absent. Stamens up to 10, free from one another or slightly united at the base; anthers 2-celled, dehiscing longitudinally. Ovary superior, sessile or shortly stipitate, 1-celled or imperfectly divided at

the base, with free-central placentation; styles free or variously connate; ovules mostly numerous. Capsule opening by valves or apical teeth. Seeds with endosperm and a more or less curved peripheral or excentric embryo.

Widely distributed in the North Temperate Zone, especially in the Mediterranean region; comparatively rare in the tropics and mostly at high elevations.

Stipules absent; stamens 10 or fewer:
Sepals free from one another; ovary sessile:
Petals bifid:
Styles 5, opposite the sepals; capsule more or less cylindrical **1. Cerastium**
Styles 3, alternate with the sepals; capsule globose to oblong .. .. **2. Stellaria**
Petals entire; styles 5; capsule opening by valves .. .. .. **3. Sagina**
Sepals connate in the lower half; stamens 5; styles 5; ovary sessile; straggling herb with long-pilose branches .. .. **4. Uebelinia**
Sepals connate into a tube; styles 3; stamens 10; ovary stipitate; capsule dehiscing by 3 or 6 teeth or valves; erect herbs .. .. **5. Silene**
Stipules present, rarely inconspicuous; sepals free; stamens 5 or fewer:
Stipules small and interpetiolar, divided into subulate segments, not scarious; styles 3, connate below; capsule 3-valved; filaments shortly united at the base **6. Drymaria**
Stipules large and conspicuous, scarious, not divided:
Sepals with a thick green keel and membranous margins .. **7. Polycarpon**
Sepals not keeled, uniformly membranous .. .. **8. Polycarpaea**

1. CERASTIUM Linn.—F.T.A. 1 : 140.

Stems weak, with very long internodes, slightly glandular-pilose in the upper parts; leaves up to about 3·5 cm. long; flowers in small terminal few-flowered cymes; sepals scarcely membranous on the margin; capsule a little longer than the sepals **1. *africanum***
Stems rather short, with short internodes, densely glandular-pilose; leaves up to about 1·5 cm. long; flowers numerous, rather crowded in a leafy cyme; sepals with broadly membranous margins; capsule much exceeding the sepals **2. *viscosum***

1. **C. africanum** *Oliv.*—F.T.A. 1 : 141. Herb, branching, 1–2 ft. high.
Cameroons Mt., 7,000–10,000 ft. (Dec.)! Also in the mountains of East Africa from Abyssinia to Lake Nyasa and Transvaal. Exsicc.—*Mann* 1941.
2. **C. viscosum** *Linn.*—F.T.A. 1 : 140, as *C. vulgatum* Linn. Herb, diffuse or ascending.
Cameroons Mt. (Dec.)! A cosmopolitan weed. Exsicc.—*Mann* (no number).

2. STELLARIA Linn.—F.T.A. 1 : 141.

A weak diffuse herb 1–2 ft. high; branches slightly pubescent in the upper part; leaves petiolate, ovate, acutely and gradually acuminate, rounded or slightly cuneate at the base, entire or crispate on the margin, 2–2·5 cm. long, 1–1·5 cm. broad, very thin, minutely pubescent, at length pustulate on the upper surface; flowers white, few, in terminal cymes; pedicels up to 0·8 cm. long; sepals lanceolate, acute, slightly pubescent; petals about the same length as the sepals, bifid .. .. ***Mannii***

S. Mannii *Hook. f.*—F.T.A. 1 : 141, partly.
Cameroons Mt., 7,000 ft. (Dec.)! Exsicc.—*Mann* 1940.

3. SAGINA Linn.—F.T.A. 1 : 142.

A small often tufted herb; leaves linear, acute, up to 2·5 cm. long; pedicels 1 cm. long; sepals ovate-lanceolate, acute, glabrous; petals shorter than sepals ***abyssinica***

S. abyssinica *Hochst.*—F.T.A. 1 : 142.
Cameroons Mt., 9,000–11,000—(Dec., Jan.)! Fernando Po, 8,500 ft. (April)! Also in Abyssinia and E. African mts. Exsicc.—*Mann* 1288; 2027.

4. UEBELINIA Hochst.—F.T.A. 1 : 140.

A herb with long straggling stems rooting at the lower nodes, pilose with long stiff hairs; leaves petiolate, rounded-obovate, acute, abruptly narrowed into the winged petiole, setose on the margin and midrib, 1–1·5 cm. long, 0·7–1 cm. broad; flowers solitary, axillary; pedicels up to 1 cm. long in fruit; calyx about 5 mm. long; lobes ovate-lanceolate, acute, setose; capsule shorter than the calyx ***hispida***

U. hispida *Pax* in Engl. Bot. Jahrb. 17 : 586.
Cameroons Mt.: west of Buea, 3,000 ft. (Sept.)! Exsicc.—*Preuss* 971.

5. SILENE Linn.—F.T.A. 1 : 138.

Stems and leaves very shortly pubescent, not glandular; leaves narrowly linear, tapered to the apex; flowers in terminal cymose racemes, the pedicels in fruit up to 3 cm. long; calyx with strong coloured nerves, gradually tapered to the base 1. *Biafrae*

Stems and leaves densely glandular-pubescent, oblanceolate or linear-oblanceolate; pedicels in fruit about 1 cm. long; calyx faintly nerved, contracted towards the base ..... *2. villosa*

1. **Silene Biafrae** *Hook. f.*—F.T.A. 1 : 139. Erect, 1–3 ft., simple or slightly branched. Cameroons Mt., 8,000–10,000 ft. (Nov., Dec.) ! Endemic. Exsicc.—*Mann* 2034.
2. **S. villosa** *Forsk.*—Chev. Bot. 45. French Sudan: Bilma (Jan.). Also in Algeria and Egypt. Exsicc.—*Chev.* 28626 (not seen).

6. DRYMARIA Willd.—F.T.A. 1 : 143.

A weak straggling herb up to 3 ft. high, glabrous or nearly so; stems quadrangular; leaves petiolate, opposite, distant, broadly ovate, rounded or subcordate at the base, mucronulate, 1–2·5 cm. long, up to 2 cm. broad, papery, 3–5-nerved; stipules interpetiolar, divided into subulate segments; flowers in terminal few-flowered puberulous cymes; sepals oblong-lanceolate, about 5 mm. long, with a distinct midrib and 2 lateral nerves, becoming dry and membranous in fruit; petals shorter than the sepals, bifid .. .. *cordata*

FIG. 39.—DRYMARIA CORDATA *Willd.* (CARYOPHYLLACEAE).

A, B, sepals. C, petal. D, stamen. E, flower. F, stamens united at the base. G, longitudinal section of ovary. H, I, seed. J, stipules.

D. cordata *Willd.*—F.T.A. 1 : 143; Chev. Bot. 45. French Guinea: Futa Jallon (Sept.); Dalaba-Diaguissa Plateau, 3,000–4,000 ft. (Oct.). Sierra Leone: Yakala, 150 ft. (Sept.). Ivory Coast: Upper Sassandra, about 3,000 ft. (May). Cameroons Mt., 7,000 ft. (Dec.-Jan.) ! Fernando Po, 1,000 ft. (Nov.) ! Widely dispersed in the tropics and subtropics. Exsicc. —*Mann* 581; 1319; 1942. *Thomas* 2383.

7. POLYCARPON Linn.—F.T.A. 1 : 144.

A straggling herb sparsely clothed with branched hairs; leaves opposite or verticillate, oblanceolate or sublinear, acute, up to 1·5 cm. long and about 4 mm. broad; stipules scarious, ovate-lanceolate, acute, about ¼ the length of the leaves; flowers very numerous in paniculate bracteate cymes; sepals with a thick keel and broad membranous margins, minutely ciliolate .. .. *Loeflingii*

P. Loeflingii *Benth. & Hook. f.*—F.T.A. 1 : 144; Chev. Bot. 45. In river beds and mudflats in the savannah regions throughout the area; also in other parts of tropical Africa, and India.

8. POLYCARPAEA Lam.—F.T.A. 1 : 144.

Sepals loosely woolly-pubescent ; leaves obovate, thick, less than 1 cm. long, densely and softly hoary-tomentose, especially when young ; flowers in dense terminal cymes .. .. 1. *nivea*

Sepals loosely pubescent ; leaves linear, about 1–1·5 cm. long, with fine setose points ; plant dwarf and very diffuse, with very numerous flowers in lax cymes spreading all over the plant .. .. 2. *eriantha*

Sepals glabrous :

Leaves obtuse, glabrous, lanceolate, finely punctate, about 1 cm. long and 2–3 mm. broad, rather obscurely 3-nerved ; stipules about half as long as the leaves, with long filiform tips ; flowers in few densely clustered heads .. 3. *glabrifolia*

Leaves linear with fine setiform tips :

Flowers crowded into small single or laxly cymose heads :

Heads more or less solitary, about 1·5 to 2 cm. or more in diam., with very numerous flowers ; sepals not very long-acuminate .. .. 4. *linearifolia*

Heads cymose, rather few-flowered, about 0·5 cm. in diam. ; sepals acutely long-acuminate .. .. 5. *stellata*

Flowers rather laxly cymose, rarely the cymes somewhat congested :

Cymes rather few and not completely hiding the remainder of the plant 6. *corymbosa*

Cymes very numerous and much-branched, more or less spreading over the whole plant .. .. 6. *corymbosa* var. *effusa*

FIG. 40.—POLYCARPAEA LINEARIFOLIA *DC.* (CARYOPHYLLACEAE).

A, node showing leaves and stipules, one stipule detached. B, leaf. C, a branch from the inflorescence, enlarged. D, D1, bracts from the inflorescence. E, calyx. F, flower laid open. G, sepal. H, petal. I, stamens, front and back. J, ovary. K, the same in vertical section. L, capsule opening by 3 valves. M, seed, with longitudinal and cross-sections. N, embryo.

1. **P. nivea** *Webb*—Chev. Bot. 46. A woody undershrub.
Mauritania : Port Étienne (Feb., Mar.) ! Exsicc.—*Caille* 25417.

2. **P. eriantha** *Hochst.*—F.T.A. 1 : 145, under *P. corymbosa* Lam. Like the following 4 species, a herb of sandy places and dry fields ; petals pink-tinged ; flowers opening only in sunshine.
Senegal : several localities ! Bondou ! Gold Coast : Accra (May, Oct.) ! N. Nigeria : Sokoto (Sept., Oct., Nov.) ! Widely distributed in tropical Africa. Exsicc.—*Heudelot* 135. *Ansell* (no number).

3. **P. glabrifolia** *DC.*—F.T.A. 1 : 146. *P. platyphylla* Pax—Stapf 580 ; Chev. Bot. 46.
Sierra Leone (Mar.) ! Liberia : Grand Bassa ! And also in Senegal, French Sudan, French Guinea, Ivory Coast, Dahomey and in the Ubangi-Shari region (according to Chevalier). Exsicc.—*Don. T. Vogel* 69. (See Appendix).

4. **P. linearifolia** *DC.*—F.T.A. 1 : 146 ; Chev. Bot. 46.
Throughout the area and in tropical Africa generally. (See Appendix).

5. **P. stellata** *DC.*—F.T.A. 1 : 145 ; Chev. Bot. 47.
French Sudan : Macina (Sept.). S. Nigeria : Idah (Sept.) ! Exsicc.—*T. Vogel.*

6. **Polycarpaea corymbosa** *Lam.*—F.T.A. 1 : 145 ; Chev. Bot. 46. *P. djalonis* A. Chev. Bot. 46.
Throughout the area and in tropical Africa generally, and in tropical Asia. (See Appendix).
Var. **effusa** Oliv.—F.T.A. 1 : 145.
French Guinea : Kouroussa ! Gold Coast : Accra (Oct.) ! N. Nigeria : Nupe ! Lokoja ! Also in Angola. Exsicc.—*T. Vogel* (no number). *Barter* 808. *Dalton. Dalz.* 105. *Pobéguin* 459.

28. MOLLUGINACEAE

Herbs. Leaves alternate or opposite ; stipules none or very small and soon falling off. Flowers actinomorphic, hermaphrodite, solitary or cymose, usually small and inconspicuous. Sepals free or united at the base only, imbricate. Petals small or absent. Stamens hypogynous or slightly perigynous, definite or many ; filaments free to connate at the base ; anthers 2-celled, opening lengthwise. Ovary syncarpous (except *Gisekia*), usually several-celled ; styles or stigmas as many as the cells ; ovules curved or inverted. Fruit dry, dehiscing into the cells or by a transverse slit, rarely indehiscent, calyx usually persistent. Seeds with endosperm, the embryo curved.

Mostly weedy plants of dry places, distinguished from the *Ficoidaceae*, with which they were formerly united, by the hypogynous flowers and free sepals.

Leaves alternate ; ovary syncarpous ; fruits 2-coccous :
Fruits not winged, rugose or tuberculate .. .. 1. **Limeum**
Fruits broadly winged .. .. 2. **Semonvillea**
Leaves opposite, subverticillate or subopposite :
Ovary apocarpous, carpels 5, muricate ; leaves marked with numerous raphides 3. **Gisekia**
Ovary syncarpous ; leaves not marked with raphides :
Seeds without a strophiole ; erect plants, glabrous and often glaucous ; radical leaves different from the stem-leaves or all leaves radical .. 4. **Mollugo**
Seeds with a conspicuous strophiole ; diffuse or ascending herbs, tomentose or pubescent ; no radical leaves .. .. 5. **Glinus**

1. LIMEUM Linn.—F.T.A. 2 : 595.

Glabrous ; leaves alternate, linear, acute, up to 2 cm. long ; flowers in leaf-opposed subsessile or pedunculate clusters ; sepals oblong-elliptic, very acute, with broad green midrib and hyaline margins ; fruits rugose .. .. .. 1. *linifolium*
Viscous ; leaves alternate, obovate or spathulate, rounded at the apex, mucronate, petiolate, about 2 cm. long and 1 cm. broad, distinctly nerved ; flowers in leaf-opposed cymes terminating short leafy lateral branchlets ; sepals broadly elliptic, obtuse, with paler margins ; fruits tuberculate .. .. .. 2. *viscosum*

1. **L. linifolium** *Fenzl*—F.T.A. 2 : 596 ; Chev. Bot. 302. A diffuse glabrous annual.
French Sudan : Timbuktu (July), Goundam (Aug.). Senegal : several localities ! Also in Kanem, east of Lake Chad. Exsicc.—*Perrottet. Leprieur.*
2. **L. viscosum** *Fenzl*—F.T.A. 2 : 595 ; Chev. Bot. 303. Annual, diffuse or ascending, 1 ft. or more.
Extends all over tropical Africa and into S.E. Africa. Exsicc.—*Leprieur. Heudelot* 479. *Sieber* 62.

2. SEMONVILLEA J. Gay—F.T.A. 2 : 594.

An erect or rather diffuse nearly glabrous herb ; leaves alternate, linear or linear-lanceolate, subacute, shortly petiolate, up to about 5 cm. long and 7 mm. broad, rather faintly nerved ; stipules absent ; flowers small, few, in pedunculate subcapitate cymes ; sepals ovate-lanceolate, with broad green midrib and hyaline margins ; petals absent ; fruit orbicular, puberulous, separating into two broadly winged 1-seeded cocci about 1 cm. in diam., the wings with radiating forked nerves and a very narrow membranous margin .. .. *pterocarpa*

S. pterocarpa *J. Gay*—F.T.A. 2 : 594 ; Chev. Bot. 302. In fields and waste places.
French Sudan : Sompi (Oct.) ! S. Macina (Sept.) ! Senegal : various localities ! N. Nigeria : Sokoto (Aug.) ! Extends to the Eastern Sudan, and also in the Transvaal and Orange Free State. Exsicc.—*Heudelot. Richard. Dalz.* 415.

3. GISEKIA Linn.—F.T.A. 2 : 593.

A rather variable weed, diffuse or decumbent ; leaves opposite or subopposite, varying from oblanceolate to linear, subacute or obtuse, up to 4 cm. long and 1 cm. broad, thickly clothed below with numerous conspicuous raphides ; flowers in sessile or pedunculate often many-flowered cymes at the nodes ; pedicels up to 1 cm. long ; sepals elliptic-rounded, trinerved, with hyaline margins ; petals absent ; carpels 5, muricate .. .. *pharnaceoides*

G. pharnaceoides *Linn.*—F.T.A. 2 : 593, incl. vars. *congesta* and *pedunculata* Oliv. ; Holl. 2 : 341 ; Chev. Bot. 302. *G. linearifolia* Schum. & Thonn. The plant is often subject to a blight which renders it pink or wine-red in colour.
French Sudan : Zamblora (June) ! Sindou (May), Férélba (Aug.). Senegal : various localities ! Togo : Lome ! N. Nigeria : Sokoto (July, Sept.) ! Katagum ! Nupe ! Extends to the Eastern Sudan and Somaliland, to the Congo, S. W. Africa and the Cape ; also in the Mascarene Islands and India. Exsicc.—*Heudelot* 498. *Barter* 1734. *Warnecke* 33. *Chev.* 867. (See Appendix).

4. MOLLUGO Linn.—F.T.A. 2 : 589.

Leaves all radical, persistent, spathulate-oblanceolate, up to 6 cm. long and 2 cm. broad ; inflorescence cymose-corymbose, lax, the pedicels long and slender ; seeds minutely and closely muricate .. .. 1. *nudicaulis*

Leaves radical and cauline, the radical ones spathulate-obovate, up to 1·5 cm. long, soon disappearing, the cauline ones linear-acicular, pseudo-verticillate, obtuse ; inflorescence leafy, subumbellate ; seeds smooth, triangular, pale brown .. 2. *Cerviana*

Leaves radical and cauline, the former soon disappearing, the cauline ones narrowly oblanceolate, 1–1·5 cm. long, 3–4 mm. broad ; flowers in sessile or shortly pedunculate clusters ; seeds smooth, black and shining, turgid .. .. .. 3. *Chevalieri*

1. **M. nudicaulis** *Lam.*—F.T.A. 2 : 591 ; Chev. Bot. 301. An erect glabrous annual from 3–10 in. high, in waste places.
   Common throughout the area, and widely spread in tropical Africa, to Afghanistan, and in the Mascarene Islands.
2. **M. Cerviana** *Seringe*—F.T.A. 2 : 591 ; Holl. 2 : 341 ; Chev. Bot. 300. An erect glaucous annual, often much branched, from 2 to 6 or more inches high ; in sandy places, river-beds, etc.
   Found throughout the area and widely distributed in the warmer parts of the Old World.
3. **M. Chevalieri** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *M. verticillata* A. Chev. Bot. 301, not of Linn. A glabrous annual a few inches high.
   French Sudan : San, banks of the Bani River (June) ! Exsicc.—*Chev.* 1080.

FIG. 41.—MOLLUGINACEAE.

A, Mollugo nudicaulis *Lam.* E, seed of same. B, fruit of Semonvillea pterocarpa *J. Gay.* C, fruit of Limeum linifolium *Fenzl.* D, seed of Glinus lotoides *Loefl.* F, fruit of Gisekia pharnaceoides *Linn.*

5. GLINUS Linn.—F.T.A. 2 : 589, as *Mollugo* Linn., in part.

Leaves obovate, slightly apiculate, about 3 cm. long including petiole, 1 cm. or more broad, densely stellate-tomentose to almost glabrous ; flowers subsessile or the pedicels shorter than the calyx ; seeds granular-verrucose .. 1. *lotoides*

Leaves oblanceolate, slightly toothed towards the apex, glabrous or nearly so, 2·5–3 cm. long, up to 0·75 cm. broad ; flowers on pedicels much longer than the calyx ; seeds as above .. .. 2. *oppositifolius*

1. **G. lotoides** *Loefl.* It. Hisp. 145. *Mollugo Glinus* A. Rich.—F.T.A. 2 : 590 ; Chev. Bot. 301. A herb of moist sandy places.
   Found in the tropics and subtropics generally.
2. **G. oppositifolius** *A.DC.* in Bull. Herb. Boiss., Sér. 2, 1 : 559. *G. Spergula* Steud. *Mollugo Spergula* Linn. —F.T.A. 2: 590 ; Holl. 2 : 341 ; Chev. Bot. 301. *Mollugo oppositifolia* Linn.
   Habitat as in the preceding species ; found in the tropics and subtropics generally.

29. FICOIDACEAE

Herbs or low shrubs, often fleshy. Leaves alternate or opposite, sometimes very small, stipulate or not. Flowers actinomorphic, usually hermaphrodite. Calyx-tube free or adnate to the ovary ; lobes 5–8, imbricate or rarely valvate, herbaceous. Petals numerous or absent, 1- or more-seriate, inserted in the calyx-tube. Stamens perigynous, many or few, rarely 1, free or united at the base

into bundles; anthers 2-celled, small, opening lengthwise. Ovary superior or inferior, 1–several-celled; ovules solitary to many, basal, apical or axile. Fruit a capsule or nut-like and drupaceous, often clasped by the persistent calyx.

Generally found on sandy shores and desert places, mainly in the subtropics; comparatively rare in America. Recognised by the usually fleshy habit, opposite leaves, small or narrow petals, several-celled ovary with axile placentas, endospermic curved seeds and curved embryo.

Ovary superior, more or less free from the calyx; capsule opening by a transverse circular split; petals absent:
Leaves more or less equal in each pair; ovary 3–5-celled, rarely 2-celled; fruit with numerous seeds; leaves very succulent .. .. 1. **Sesuvium**
Leaves conspicuously unequal in each pair; ovary 1–2-celled; fruits 1-several-seeded .. .. 2. **Trianthema**
Ovary inferior or semi-inferior; capsule opening lengthwise or by valves:
Petals numerous, linear; fleshy plants with pustulate leaves; fruits leathery 3. **Mesembryanthemum**
Petals absent; subwoody plants with pubescent leaves; fruits woody 4. **Aizoon**

1. SESUVIUM Linn.—F.T.A. 2 : 585.

A diffuse succulent glabrous herb with procumbent stems often rooting at the nodes; leaves opposite, succulent, linear-oblanceolate to obovate, obtuse, up to 4·5 cm. long and 1 cm. broad; flowers axillary, solitary, pedicellate, purplish or rose; calyx deeply 5-lobed, obconic at the base, lobes ovate-lanceolate with a small dorsal horn at the apex and fairly broad membranous margins; petals none; ovary 3-celled, superior; seeds black and nearly smooth .. .. *Portulacastrum*

S. Portulacastrum *Linn.*—F.T.A. 2 : 585; Chev. Bot. 300.
Common on the shores of the tropics and subtropics of both hemispheres. Used as a pot-herb. "Seaside Purslane."

2. TRIANTHEMA Linn.—F.T.A. 2 : 587.

Diffuse prostrate herb; branches glabrous or nearly so; leaves opposite or subopposite, anisophyllous, sheathing at the base, distinctly petiolate, obovate, sometimes obcordate, the larger leaf up to 3·5 cm. long and 1·5–3 cm. broad, broadly mucronate, glabrous, with distinct clusters of crystals showing on the surfaces, the lesser leaf much smaller than the larger; flowers solitary, sessile, partly enclosed by the sheathing leaf-base; style 1 .. .. 1. *Portulacastrum*

Diffuse prostrate herb; branches setulose-pubescent; leaves slightly anisophyllous, opposite, expanded at the base, petiolate, oblong-obovate, rounded at the apex, up to 5 cm. long and 2·5 cm. broad, shortly setulose or almost glabrous; flowers clustered, axillary, almost sessile; styles 2 .. .. 2. *pentandra*

1. **T. Portulacastrum** *Linn.* Sp. Pl. 223. *T. monogyna* Linn.—F.T.A. 2 : 587; Holl. 2 : 341; Chev. Bot. 300. A weed of waste places; sepals often pink-tinged.
French Sudan: Timbuktu (July). Ivory Coast: Mankono (June)! Gold Coast: Cape Coast (July)! Accra (Feb.)! Togo: Lome! N. Nigeria: Katagum (July)! Sokoto! Extends to Abyssinia, Zanzibar and Madagascar; also in tropical America and Asia. Exsicc.—*T. Vogel* 57. *Dalz.* 69; 145. *Warnecke* 317. (See Appendix).

2. **T. pentandra** *Linn.*—F.T.A. 2 : 588; Holl. 2 : 341; Chev. Bot. 300. A weed of waste places; sepals green, with whitish edges and a small dorsal horn below the apex.
French Sudan: Timbuktu (July)! Senegal (Dec.)! N. Nigeria: Katagum (July)! Kuka (Feb.)! Borgu! Widely distributed across to the Eastern Sudan and Somaliland, East and Central Africa south to Ngamiland, the Mascarene Islands, etc.; extends to Arabia and N.W. India. Exsicc.—*Roger* 29. *E. Vogel* 52; 59. *Barter* 744. *Dalz.* 146. (See Appendix).

3. MESEMBRYANTHEMUM Linn.—F.T.A. 2 : 582.

A low-spreading fleshy annual herb covered with crystal-like pustules; leaves broadly obovate-spathulate; flowers white, in lax cymes; petals numerous, linear; capsule with leathery valves at the top .. .. *crystallinum*

M. crystallinum *Linn.*—Chev. Bot. 299.
Mauritania: near El Fares, etc.! Exsicc.—*Charles* 25522. *Schmitt* 28588.

4. AIZOON Linn.—F.T.A. 2 : 583.

A dense spreading herb closely appressed to the soil, woody at the base; leaves spathulate, about 2 cm. long, pitted when dry and more or less pilose; flowers sessile in the axils of the leaves; fruits woody at the top and pentagonal; seeds black *canariense*

A. canariense *Linn.*—Chev. Bot. 300.
Mauritania: Thiza (Feb.)! Exsicc.—*Charles* 25524.

30. PORTULACACEAE

Herbs or undershrubs, often succulent; leaves alternate or opposite, with scarious or setose stipular appendages. Flowers actinomorphic, hermaphrodite, solitary or variously cymose or racemose. Sepals 2, imbricate, free or united at the base. Petals 4–6, imbricate, free or connate at the base, soon falling. Stamens as many as and opposite the petals or more numerous, free; anthers 2-celled. Ovary superior or half-inferior, 1-celled with basal placenta; ovules 1 to many; style usually variously divided. Fruit a capsule dehiscing by valves or by a transverse split (circumscissile), rarely a nut and indehiscent. Seeds globose-reniform; embryo surrounding the copious mealy endosperm.

Widely spread in warmer regions, often occurring as weeds in cultivated places. Recognised by the succulent habit, 2 sepals, and the basal placentation.

Ovary superior; capsule opening by valves; seeds radiate-striate; flowers in lax inflorescences .. .. 1. **Talinum**
Ovary half-inferior; capsule opening by a transverse split (circumscissile); seeds verrucose; flowers solitary or fascicled .. .. 2. **Portulaca**

1. TALINUM Adans.—F.T.A. 1 : 149.

A succulent erect herb, woody at the base; leaves alternate, obovate-oblanceolate, emarginate and mucronate at the apex, cuneate into a petiole at the base, 3–7 cm. long, 1·5–3 cm. broad, rather fleshy and glabrous; flowers pink, in lax forked inflorescences; pedicels about 0·5 cm. long; sepals ovate, acuminate, with 3 main green nerves, membranous on the margin; petals about twice as long as the sepals; capsule 5–6 mm. long, straw-coloured, smooth; seeds radiate-striate *triangulare*

T. triangulare *Willd.*—Holl. 1 : 61. *T. crassifolium* Willd.—F.T.A. 1 : 150; Chev. Bot. 48.
In cultivated ground chiefly in the coastal regions, probably introduced from tropical America. (See Appendix).

2. PORTULACA Linn.—F.T.A. 1 : 148.

Stipules minute or obsolete; leaves flat, spathulate-oblanceolate, rounded at the apex; flowers yellow .. .. 1. *oleracea*
Stipules thread-like and more or less persistent:
Stipular setae confined or almost confined to around the flowers; leaves terete and succulent .. .. 2. *foliosa*
Stipular setae equally distributed along the branches:
Leaves linear; flowers large, white or yellow to rose-red .. .. 3. *grandiflora*
Leaves lanceolate or ovate-lanceolate to obovate; flowers smallish, yellow 4. *quadrifida*

1. **P. oleracea** *Linn.*—F.T.A. 1 : 148; Chev. Bot. 48; Holl. 1 : 61. An annual with spreading or prostrate succulent branches.
Cosmopolitan in sandy places in warm climates. (See Appendix).
2. **P. foliosa** *Ker*—F.T.A. 1 : 148; Chev. Bot. 47. An erect or decumbent herb, often woody below; flowers yellow, solitary or in small heads.
French Sudan: several localities (Dec., June, Aug.). Ivory Coast: Middle Sassandra (May). Dahomey: Agouagon (May). N. Nigeria: Nupe! Lokoja (Mar.)! Yola (Jan.)! S. Nigeria: Idah (Sept.)! Nun R.! Extends to Abyssinia, Uganda and Zambesi. Exsicc.—*T. Vogel* 173. *Carter* 138.
3. **P. grandiflora** *Hook.* in Bot. Mag. t. 2885. Stems diffuse, branched, with long pale hairs at the nodes; leaves terete.
N. Nigeria: Abinsi (July)! A weed around houses; native of South America.
4. **P. quadrifida** *Linn.*—F.T.A. 1 : 149; Holl. 1 : 61. *P. chariensis*, *P. elatinoides*, *P. lanuginosa*, *P. rubens*, all of A. Chev. Bot. 47, 48. A prostrate or decumbent annual, conspicuously woolly at the nodes; very variable in shape and size of leaves.
Waste places in warm countries.

31. POLYGONACEAE

Herbs, shrubs or climbers, rarely trees; leaves alternate, with the base of the petiole often dilated into a membranous sheath (ochrea). Flowers hermaphrodite, polygamous or dioecious, actinomorphic, small and inconspicuous. Sepals 3–6, imbricate, often enlarged and becoming membranous in fruit. Petals absent. Stamens usually 6–9, rarely more; filaments free or united at the base; anthers 2-celled, opening lengthwise. Disk annular or central. Ovary superior, sessile, 1-celled; styles 2-4, usually free; ovule solitary, basal, sessile or stalked. Fruit an indehiscent trigonous or 2-sided nut. Seeds with abundant mealy endosperm and often excentric embryo.

A cosmopolitan family. Recognised by the alternate simple leaves with sheathing ochreae stipules, small apetalous flowers, often persistent enlarged sepals, 1-celled 1-ovuled ovary, and endospermic seeds.

Leaves much reduced, linear or subulate, soon falling off ; a woody desert shrub ; sepals not enlarged in fruit ; stamens 12–18, the filaments united at the base and with hairy appendages ; fruit densely covered with branched bristles 1. **Calligonum**

Leaves not reduced, persistent ; herbs, shrubs or climbers ; sepals persistent and often more or less enlarged in fruit ; stamens not united at the base ; fruit not bristly :

Flowers dioecious, the male in lax panicles ; stamens 20–30, inserted on a central disk ; inner female sepals enlarged, enclosing the fruit and becoming pyramidal and trigonous .. .. 2. **Symmeria**

FIG. 42.—SYMMERIA PANICULATA *Benth.* (POLYGONACEAE).
A, base of petiole. B, flowering and fruiting branch. C, fruit.

Flowers hermaphrodite or polygamous ; stamens 5–8 ; inner sepals not as above :

A climber with tendrils ; leaves amplexicaul at the base without a membranous sheath ; pedicels with a broad wing on each side especially in fruit ; nut enclosed in the calyx .. .. 3. **Afrobrunnichia**

Herbs ; flowers varying from white to red ; sepals more or less equal ; stipules forming a tubular sheath within the petiole, often with long bristles at the apex 4. **Polygonum**

Herbs ; flowers as above or brownish, inner sepals much enlarged and membranous in fruit ; stipules more or less adnate to the petiole, not bristly 5. **Rumex**

1. CALLIGONUM Linn.—Benth. & Hook. f. Gen. Pl. 3 : 95.

A glabrous almost leafless shrub, with jointed branches and slender branchlets; leaves much reduced and soon falling off; flowers in short fasciculate racemes on the older branches; pedicels about 3 mm. long, jointed towards the base; sepals 5–6, obovate, somewhat membranous towards the margin; stamens 12–18; fruit-body ellipsoid, covered with numerous branched bristles .. .. *comosum*

C. comosum *Linn.*—Chev. Bot. 536.
Mauritania: Adrar (Feb.). Eastwards to Afghanistan. Exsicc.—*Chev.* 28583; 28785; 28869.

2. SYMMERIA Benth.—F.T.A. 6, 1 : 118.

A dioecious tree or shrub; leaves almost amplexicaul, elliptic, more or less cordate at the base, rounded at the apex, 15–20 cm. long, 6–9 cm. broad, with about 12 lateral nerves, reticulate on both surfaces; petiole 1·5 cm. long, winged on the upper side, the wings overlapping; male inflorescence minutely rusty-puberulous, up to

FIG. 43.—AFROBRUNNICHIA ERECTA *Hutch. & J. M. Dalz.* (POLYGONACEAE).

A, flower.
B, stamen.
C, ovary with styles.
D, fruits.

about 20 cm. long, female inflorescence much smaller; fruits enclosed by the enlarged trigonous calyx, about 1·5 cm. long and 0·8 cm. broad .. *paniculata*

S. paniculata *Benth.*—F.T.A. 6, 1 : 118.
Senegal! Sierra Leone: Limba (April)! Karene (April)! Kambia (Jan.)! Also in British Guiana and Brazil. Exsicc.—*Heudelot* 334. *Sc. Elliot* 4467; 5573.

3. AFROBRUNNICHIA Hutch. & J. M. Dalz. in Kew Bull. 1927, ined.

A woody climber by special tendriliform lateral branchlets; branches terete or more or less ribbed and striate, glabrous; leaves elliptic, caudate-acuminate, rounded or shortly cuneate at the base, 6–10 cm. long, up to 6 cm. broad, glabrous; petiole 1–1·5 cm. long; pedicels broadly winged on each side, elongating in fruit up to 7 cm. long and 1·3 cm. broad; fruits narrowly ovoid, about 1·5 cm. long including the persistent almost closed calyx-lobes .. .. *erecta*

A. erecta *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *Brunnichia erecta* Aschers.—F.T.A. 6, 1 : 119. *B. africana* Welw. var. *glabra* Dammer—F.T.A. 6, 1 : 119; Chev. Bot. 538. *B. africana* Stapf 644, not of Welw. Flowers colourless or reddish; fruits pendulous, the winged pedicel often wine-red.
Liberia: Kakatown! Ivory Coast: several localities (Dec., Jan., July). Gold Coast: Bompata (Dec.)! S. Nigeria: Lagos Colony, Ijan (Jan.)! Oban! Also in Cameroons and Gabon. Exsicc.—*Whyte. Millen* 140. *Talb.* 1497.

4. POLYGONUM Linn.—F.T.A. 6, 1 : 103.

Flowers arranged in axillary clusters or small heads; stems more or less prostrate: Leaves subsessile, oblong or linear-oblong, acute, 0·5–1 cm. long, 2–3 mm. broad, with revolute margins; ochrea more or less lacerate, white; flowers in axillary clusters; nutlet smooth and shining .. .. 1. *plebeium*

Leaves ovate, about 1·5–2 cm. long and 1–1·5 cm. broad, narrowed into a winged petiole ; ochrea entire, brownish, up to 1 cm. long ; flowers in pedunculate clusters ; nutlet closely pitted .. .. 2. *alatum*

Flowers arranged in spike-like racemes or panicles :

Ochrea with a spreading or recurved herbaceous ciliate limb, long-pilose on the outside ; leaves linear-lanceolate, up to about 10 cm. long and 2 cm. broad, pubescent on the nerves below or glabrous ; racemes dense-flowered.. .. 3. *limbatum*

Ochrea without a herbaceous limb :

Leaves densely hairy below :

Cilia at the apex of the ochrea absent or very small and weak ; leaves white below, with a woolly indumentum, gradually narrowed into the petiole 4. *lanigerum*

Cilia at the apex of the ochrea very long and conspicuous ; leaves not quite white below, with a pilose indumentum, abruptly narrowed into the petiole 5. *tomentosum*

FIG. 44.—POLYGONUM LIMBATUM *Meisn.* (POLYGONACEAE).

A, portion of leaf, upper surface. B, lower surface of same. C, ochrea. D, flower. E, flower laid open. F, G, stamens, front and back. H, ovary with styles. I, vertical section of ovary. J, cross-section of ovary. K, portion of inflorescence. L, portion of same, enlarged. M, N, bracts, inner and outer face.

Leaves glabrous or rather sparingly pubescent below :

Racemes very short, not more than 1 cm. long ; leaves lanceolate, acute at the apex, cuneate at the base, up to 15 cm. long and 2·5 cm. broad ; ochrea membranous, glabrous except the shortly ciliate apex ; branches of inflorescence with stalked glands ; nutlet biconvex, straw-coloured .. .. .. 6. *pedunculare*

Racemes much more than 1 cm. long :

Ochrea without or with very small and few cilia at the apex ; bracts not ciliate ; leaves elongate-ovate-lanceolate, about 15–20 cm. long and 3–5 cm. broad :

Peduncles glabrous ; leaves acute or shortly acuminate ; ochrea without cilia 7. *glabrum*

Peduncles finely glandular-puberulous ; leaves long-tailed-acuminate ; ochrea sometimes with a few small cilia .. .. 8. *senegalense*

Ochrea with distinct long cilia at the apex :

Leaves glabrous below except on the margin and midrib, linear-lanceolate, almost sessile, up to 12 cm. long and 1·5 cm. broad ; inflorescences lax and slender, on slender glabrous peduncles, the flowers not densely crowded ; bracts obtuse, stiffly ciliate ; nutlets trigonous .. .. 9. *serrulatum*

Leaves more or less pubescent or bristly below ; inflorescences on hairy peduncles with rather dense clusters of flowers ; bracts with slender cilia ; nutlets 2-gonous .. .. 10. *acuminatum*

1. **Polygonum plebeium** *R. Br.*—F.T.A. 6, 1 : 105 ; Chev. Bot. 537. Annual ; in fields and dried-up marshes.
French Sudan : Sikasso (April) ! Kangala (Jan.) ; Djenné (Jan.). Senegal : ? locality ! Kaedi (Dec.). Extends to Eastern Sudan and Abyssinia, Angola, S.W. Africa, C. and E. Africa and Rhodesia. Exsicc.—*Perrottet* 16. *Chev.* 749.

2. **P. alatum** *Buch.-Ham.*—F.T.A. 6, 1 : 104. Annual ; by streams, etc.
Fernando Po, 7,500 ft. (April) ! Also in Abyssinia, Uganda, Nyasaland, and in Madagascar and tropical Asia. Exsicc.—*Mann* 1449.

3. **P. limbatum** *Meisn.*—F.T.A. 6, 1 : 108 ; Chev. Bot. 537. Perennial, 3–4 ft. long ; in swamps and ditches.
French Sudan : Sébi to Mopti (Aug., Sept.). N. Nigeria : Katagum (Sept.) ! Sokoto (Nov.) ! Yola (Jan.) ! Bornu, Komadugu Waube (Dec.) ! Extends to Eastern Sudan and Egypt, Angola, Rhodesia ; also in tropical Asia. Exsicc.—*Elliott* 140. *Dalz.* 149. (See Appendix).

4. **P. lanigerum** *R. Br.*—F.T.A. 6, 1 : 109 ; Chev. Bot. 537. Perennial, 5–6 ft. long ; aquatic.
French Sudan : San (Sept.) ; Mopti (Sept.). Gambia ! French Guinea : Kankan (Mar.) ! Sierra Leone : Dantilla, R. Niger (Mar.) ! Ivory Coast : Soubré, Middle Sassandra (June). N. Nigeria : Sokoto (Oct.) ! Kontagora ! Naraguta (June) ! Lake Chad (Dec.) ! S. Nigeria : Abo ! Lagos ! Throughout tropical and South Africa ; also in tropical Asia and North Australia. Exsicc.—*Barter* 175. *Elliott* 156. *Talb.* 1498. *Sc. Elliot* 5265. (See Appendix).

5. **P. tomentosum** *Willd.*—F.T.A. 6, 1 ; 110 ; Chev. Bot. 538. Perennial, with a long rhizome ; stems 4–5 ft. long ; in swamps and by rivers.
Dahomey : Porto Novo (Jan.) ; Lake Azri (Feb.). S. Nigeria : Lagos Colony, Nun R. (Sept.) ! Throughout tropical Africa, and also in North and South Africa and tropical Asia. Exsicc.—*Mann* 493.

6. **P. pedunculare** *Wall.*—F.T.A. 6, 1 : 107 ; Chev. Bot. 537. Annual, erect or semi-decumbent.
French Guinea : Dalaba-Diaguissa, 3,000–4,000 ft. (Oct.). Also in Nyasaland, Angola, and in tropical Asia and Australia. Exsicc.—*Chev.* 18798.

7. **P. glabrum** *Willd.*—F.T.A. 6, 1 : 113 ; Chev. Bot. 537. Perennial, erect, glabrous, 3–4 ft. high.
French Sudan : Ouagadougou (Aug.). Also in Ubangi-Shari-Chad, Eastern Sudan, Abyssinia, etc., and in tropical Asia and America. Exsicc.—*Chev.* 24683.

8. **P. senegalense** *Meisn.*—F.T.A. 6, 1 : 111 ; Holl. 4 : 550 ; Chev. Bot. 537. Perennial, erect or semi-decumbent, glabrous, 4–5 ft. high or more ; in river-beds, swamps, etc.
French Sudan : Gourma (July). Senegal ! Gambia ! Gold Coast : Aburi (Sept.) ! N. Nigeria : Sokoto (Nov.) ! Katagum (July) ! Bauchi Plateau, 3,300 ft. (May) ! S. Nigeria : Ogun River ! Lagos Colony ! Throughout tropical Africa, and in Egypt, Madagascar and tropical Asia. Exsicc.—*Perrottet* 21. *Johnson* 1080. *Dalz.* 150. *Millen* 136. (See Appendix).

9. **P. serrulatum** *Lag.*—F.T.A. 6, 1 : 107 ; Chev. Bot. 537. *P. barbatum* A. Chev. Bot. 536, not of Linn. Annual, 3–4 ft. high, erect or semi-decumbent, glabrous ; in marshy places.
Fairly common from Senegal and French Sudan to Cameroons and throughout tropical Africa. Exsicc.—*Sc. Elliot* 4352. *Barter* 1551. *Mann* 762. *Chev.* 250 ; 3456 ; 14679 ; 14928 ; 15737 ; 17534. (See Appendix).

10. **P. acuminatum** *H. B. & K.*—F.T.A. 6, 1 : 112. *P. barbatum* Baker & Wright—F.T.A. 6, 1 : 109, partly, not of Linn. Herbaceous, erect or semi-decumbent, pubescent, up to 3–4 ft. high ; in moist places.
Sierra Leone : Falaba (Mar.) ! Scarcies R. (Jan.) ! N. Nigeria : Lake Chad ! Yola ! Loko (Oct.) ! Zaranda Fulani (May) ! Nupe ! S. Nigeria : Oloke Meji (Aug.) ! Extends to Abyssinia, Angola, Central and East Africa ; also in South Africa and tropical America. Exsicc.—*Barter* 874. *Sc. Elliot* 4454 ; 4498 *Talb.* 695.

5. RUMEX Linn.—F.T.A. 6, 1 : 114.

Leaves hastate, more or less triangular, acuminate, crispate on the margin, 6–15 cm. long, up to 8 cm. broad ; flowers in large much-branched panicles ; persistent perianth entire, membranous, reticulate .. .. 1. *abyssinicus*

Leaves not hastate :

Leaves lanceolate or elongate-lanceolate, acute, up to 30 cm. long and 5 cm. broad, the upper ones more or less cuneate at the base, margins crenulate or subentire ; inflorescence an elongated raceme of fascicles ; persistent perianth with pectinate hooked teeth .. .. 2. *nepalensis*

Leaves ovate or ovate-deltoid, rounded at the apex, about 3 cm. long and 2·5 cm. broad, broadly rounded at the base, subentire ; inflorescence a small panicle ; persistent perianth membranous, coloured, conspicuously reticulate, entire, notched 3. *vesicarius*

1. **R. abyssinicus** *Jacq.*—F.T.A. 6, 1 : 114. Rootstock perennial, 1 in. in diam. ; stems annual, up to several feet high.
N. Nigeria : Bauchi Plateau, 4,600 ft. (July) ! Cameroons Mt., 4,000–7,000 ft. (Nov., Dec.) ! Extends to Abyssinia, Angola, Central and East Africa, and Madagascar. Exsicc.—*Mann* 1217 ; 1978.

2. **R. nepalensis** *Spreng.*—F.T.A. 6, 1 : 117. Perennial, 4–6 ft. high.
Cameroons Mt., 7,000 ft. (Nov., Dec.) ! Extends to Eastern Sudan and Abyssinia, Central and East Africa ; also in tropical Asia. Exsicc.—*Mann* 1235 ; 1990.

3. **R. vesicarius** *Linn.*—F.T.A. 6, 1 : 117 ; Chev. Bot. 538. Herbaceous, branching at the base.
Mauritania : Adrar. Also in Eastern Sudan, Nubia, Somaliland, and from Greece to Afghanistan. Exsicc.—*Chev.* 28523 (not seen).

32. PHYTOLACCACEAE

Herbs, shrubs or trees. Leaves alternate, entire ; stipules absent or minute. Flowers hermaphrodite or unisexual, actinomorphic or nearly so, hypogynous, in simple or compound terminal or axillary racemes. Perianth simple, herbaceous or coriaceous. Sepals free or some connate, imbricate, equal or unequal. Petals absent. Stamens 3 to many, often inserted on a hypogynous disk ; filaments free or slightly connate at the base ; anthers 2-celled, cells parallel and dehiscing longitudinally. Ovary superior, composed of 1 or several carpels either free or variously connate ; style almost none or short ; ovule solitary in

each carpel, basal. Fruit of 1 or many carpels, fleshy or dry. Seed erect, with the large embryo in the periphery and enclosing the endosperm.

Sepals equal; carpels several, free or connate; fruit fleshy .. 1. **Phytolacca**
Sepals unequal, the lower one the largest; carpel 1; fruit dry .. 2. **Hilleria**

Petiveria alliacea Linn., a herb from West Indies and tropical America, occurs here and there as a casual (see Appendix).

1. PHYTOLACCA Linn.—F.T.A. 6, 1 : 96.

A straggling climber 4–7 m. long; branches flexuose, the older parts marked with the prominent callous leaf-scars; leaves elliptic or ovate-elliptic, shortly cuneate or rounded at the base, acute or acuminate at the apex, 6–10 cm. long, 4–6 cm. broad, thinly papery, long-petiolate, glabrous; racemes slender, up to 30 cm. long; pedicels slender, about 0·5 cm. long; flowers yellowish-white; fruits bright red, lobed .. .. *dodecandra*

P. dodecandra *L'Hérit.*—F.T.A. 6, 1 : 97; H. Walt. in Engl. Pflanzenr. Phytolacc. 58; Holl. 4 : 549; Chev. Bot. 536.
Sierra Leone: Talla Hills (Feb.)! Ivory Coast: Haut Cavally (May). Gold Coast: Larte (Jan.)! S. Nigeria: Lagos! Degema! Oban! Also in tropical America and other parts of tropical Africa and Asia. Exsicc.—*Sc. Elliot* 4827. *Millen* 62. *Talb.* 3800.
The plant recorded as *P. octandra* Linn. in the Flora of Tropical Africa 6, 1 : 98 is *Sphenoclea zeylanica* Gaertn.

2. HILLERIA Vell.—F.T.A. 6, 1 : 95, as *Mohlana* Mart.

Herb up to 1 m. high; leaves ovate-elliptic, obtuse or subacute at the base, acutely acuminate, up to 15 cm. long and 6 cm. broad, entire, with numerous short lines of crystals resembling appressed hairs on the lower surface; lateral nerves about 6 on each side; petiole long, with setulose hairs on the upper side; racemes slender, up to about 12 cm. long; fruit ellipsoid-globose, about 2 mm. in diam., reticulate, glabrous .. .. *latifolia*

H. latifolia *H. Walt.* in Engl. Pflanzenr. Phytolacc. 81 (1909). *Mohlana nemoralis* Mart.—F.T.A. 6; 1 : 95; Chev. Bot. 535. *M. guineensis* Moq.—Chev. Bot. 535. Naturalised in plantations and cultivated ground near villages in the forest regions.
Fairly common from the Gold Coast to Southern Nigeria and Cameroons. Also in East Africa, Angola, Mascarene Islands, and tropical America.

33. CHENOPODIACEAE

Annual or perennial herbs or shrubs, often glaucous; stems sometimes jointed; leaves alternate or rarely opposite, simple; stipules absent. Flowers small or minute, often green, hermaphrodite or unisexual, mostly actinomorphic, often bracteate. Calyx 3–5-lobed, rarely absent (in the female flowers), often accrescent in fruit; lobes imbricate or subvalvate. Petals absent. Stamens often the same number as the calyx-lobes and opposite to them, hypogynous, or inserted on a disk or on the calyx; staminodes rare; filaments usually free; anthers 2-celled, incurved in bud, opening lengthwise. Disk present or absent. Ovary superior, or immersed in the base of the calyx, 1-celled; style terminal, solitary or 2–3; ovule solitary, erect or suspended from a basal funicle. Fruit a nut, indehiscent, rarely circumscissile. Seed often erect; endosperm present or absent; embryo peripheral, surrounding the endosperm.

Mostly weeds, or desert or maritime plants often with fleshy leaves; flowers usually very small and inconspicuous; calyx sometimes membranous in fruit; embryo curved around the endosperm; stems often jointed.

Leaves ending in a rigid spiny curved point, alternate, with a hyaline margin towards the base and a tuft of woolly hairs inside .. .. 1. **Cornulaca**
Leaves not ending in a spine, at most mucronate:
Stem and branches not jointed:
Leaves flat and fairly large:
Leaves distinctly petiolate, toothed or divided, mealy or glandular on the surface; flowers bisexual .. .. 2. **Chenopodium**
Leaves sessile or nearly so, entire, covered with scales; flowers unisexual 3. **Atriplex**
Leaves small, linear or oblong and cylindric or short and triangular:
Leaves linear to oblong-oblanceolate:
Leaves and branches glabrous, the former thick and fleshy; calyx not spiny in fruit .. .. 4. **Suaeda**
Leaves and branches villous, the former not fleshy; calyx often spiny in fruit 5. **Chenolea**

Leaves broadly triangular or ovate :
Calyx with spreading membranous wings in fruit ; flowers not immersed in wool **6. Salsola**
Calyx not enlarged into wings in fruit ; flowers immersed in wool **7. Traganum**
Stem and branches jointed :
Calyx-segments enlarging in fruit and becoming membranous ; flowers not in continuous cone-like spikes .. .. **8. Haloxylon**
Calyx not enlarged or membranous in fruit ; flowers in cone-like spikes **9. Salicornia**

1. CORNULACA Del.—Boiss. Fl. Orient. 4 : 983.

An undershrub with thick twisted branches covered with brownish bark ; annual branchlets about 10 cm. long, pale, glabrous ; leaves nearly encircling the stem, triangular-lanceolate, ending in a spiny point, with a hyaline margin towards the base, densely villous inside the base, about 0·5 cm. long ; flowers axillary, sessile ; sepals 5, hyaline, linear.. .. .. *monacantha*

C. monacantha *Del.* Fl. Egypt. 206—Boiss. Fl. Orient. 4 : 984 ; Chev. Bot. 534.
Mauritania : Makter, etc., amongst dunes, etc. French Sudan : Teda Country, Sahara Desert (Nov.) ! Bilma (Jan.) ! Also in N. Africa to Afghanistan. Exsicc.—*E. Vogel* (no number). *Ducellier* in *Herb. Chev.* 28649. (See Appendix).

2. CHENOPODIUM Linn.—F.T.A. 6, 1 : 77.

Leaves broadly ovate-rhomboid, coarsely toothed or lobulate, up to 6 cm. long and 5 cm. broad, slightly mealy-puberulous ; flowers more or less in leafless panicles ; styles 2 .. .. **1.** *murale*
Leaves lanceolate to linear, coarsely serrate to subentire, up to 7 cm. long and 1·5 cm. broad, closely glandular on the lower surface ; flowers in leafy panicles ; styles 3 **2.** *ambrosioides*

1. **C. murale** *Linn.*—F.T.A. 6, 1 : 78 ; Chev. Bot. 532. A spreading branching herb.
French Sudan : Bilma (Jan.). Extends east to the Red Sea, Somaliland and Sokotra, Uganda, East Africa, Angola and S.W. Africa.
2. **C. ambrosioides** *Linn.*—F.T.A. 6, 1 : 79 ; Chev. Bot. 532 ; Holl. 4 : 544. A suberect herb, about 2 ft. high, nearly glabrous.
Dahomey : several localities. S Nigeria : Oloke Meji (Feb.) ! Also in Congo, Angola and Rhodesia ; a widely spread weed, except in cold countries. (See Appendix).

3. ATRIPLEX Linn.—F.T.A. 6, 1 : 81.

A woody undershrub ; leaves oblong-elliptic, rounded at the apex, sessile, 0·5–1 cm. long, up to 0·5 cm. broad, thick and closely covered with cinereous scales ; spikes terminal, up to 6 cm. long, leafy at the base ; sepals scaly, more or less orbicular *parvifolia*

A. parvifolia *Lowe* in Trans. Camb. Phil. Soc. 4 : 16. *Obione glauca* A. Chev. Bot. 532, not of Moq.
Mauritania : Port Étienne (Feb.–Mar.) ! Adrar. Also in Canary Islands and Morocco.

4. SUAEDA Forsk.—F.T.A. 6, 1 : 91.

Leaves linear, tipped by a hardened point, fleshy, glabrous, 1–1·75 cm. long ; flowers very small, in slender leafy panicles .. .. **1.** *maritima*
Leaves oblong-oblanceolate, rounded at the apex, thick and fleshy, glabrous, up to 1 cm. long ; flowers crowded along the branchlets .. .. .. **2.** *Volkensii*

1. **S. maritima** *Dumort.* Ic. Fl. Dan. t. 489—Boiss. Fl. Orient. 4 : 941 ; Chev. Bot. 533. A low much-branched herb, glabrous, sometimes reddish in colour.
Mauritania : Cansado Bay, opposite Port Étienne (Feb.–Mar.) ! Common on maritime shores of the Northern Hemisphere. Exsicc.—*Caille* in *Herb. Chev.* 25415.
2. **S. Volkensii** *C. B. Clarke*—F.T.A. 6, 1 : 92. *S. vermiculata* A. Chev. Bot. 533, not of Forsk. A glabrous herb.
Mauritania : common on the coast of Rio de Oro ! Also in N. and N.E. tropical Africa.

5. CHENOLEA Thunb.—Boiss. Fl. Orient. 4 : 922.

A woody undershrub, densely covered with woolly hairs ; leaves sessile, crowded, oblong to broadly elliptic, about 3–5 mm. long, very densely villous ; flowers in the axils of the upper leaves, sessile ; calyx-lobes not spinescent in fruit **1.** *canariensis*
A small shrublet, densely villous all over ; leaves linear, crowded, up to 1 cm. long ; calyx-lobes produced in fruit into rigid spreading spines .. .. .. **2.** *muricata*

1. **C. canariensis** *Moq.* Chenopod. Enum. 96—Chev. Bot. 532.
Mauritania : Port Étienne, Cape Blanco (Feb.–Mar.) ! Also in the Canary Islands and North Africa. Exsicc.—*Caille* in *Herb. Chev.* 25407.
2. **C. muricata** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *Echinopsilon muricatus* Moq.—Chev. Bot. 533.
Mauritania : Dhreine (Feb.) ! Exsicc.—*Charles* in *Herb. Chev.* 28877.

6. SALSOLA Linn.—F.T.A. 6, 1 : 87.

Branchlets slender with distinct internodes, glabrous ; leaves alternate, very small, triangular, pubescent or glabrous, thinner at the margin ; flowers crowded on short lateral branchlets, all forming a straggly panicle ; calyx-segments with a large spreading membranous wing on the back in fruit .. .. .. **1.** *brevifolia*

Branchlets rather stout, closely hairy; leaves opposite, crowded, broadly triangular, thick, densely and softly tomentose; flowers forming spikes at the ends of the branchlets; calyx-segments as above .. .. 2. *tetragona*

1. **Salsola brevifolia** *Desf.* Fl. Atl. 1 : 218—F.T.A. 6, 1 : 88, as *S. vermiculata* Linn. var. *microphylla* Moq. A much-branched undershrub.
French Guinea: Los Islands! Also in N. Africa. Exsicc.—*Roger.*
2. **S. tetragona** *Del.* Fl. Egypt. 228, t. 21, f. 4—Boiss. Fl. Orient. 4 : 957; Chev. Bot. 535. A low shrub.
Mauritania: Adrar Sutuf ("forming meadows")! Also in North Africa and Eastern Mediterranean. Exsicc.—*Schmitt* in *Herb. Chev.* 28584.

7. TRAGANUM Del.—Boiss. Fl. Orient. 4 : 946.

A low woody undershrub, much-branched; branchlets whitish; leaves alternate, broadly ovate, thick and fleshy, slightly keeled, tipped with a small sharp hardened point, 3–4 mm. long, woolly in the axils, otherwise glabrous; flowers small, sessile, with bracteoles like the leaves; calyx tubular at the base, 5-lobed, persistent in fruit but not enlarged .. .. *nudatum*

T. nudatum *Del.* Fl. Egypt. 230, t. 22, fig. 1—Chev. Bot. 534. *T. gracile* A. Chev. Bot. 534.
Mauritania: abundant in Tiris ("forming wide meadows") and elsewhere. Also in Algeria and eastward to Palestine.

8. HALOXYLON Bunge—Boiss. Fl. Orient. 4 : 948.

A glabrous low woody shrub, much-branched; branchlets slender, jointed, joints in the longer ones about 0·5 cm. long; leaves opposite, connate at the base, very small, triangular, thick; flowers spicate along the branchlets; calyx-segments enlarging in fruit and becoming membranous and more or less reniform, about 7 mm. wide *articulatum*

H. articulatum *Boiss.* Fl. Orient. 4 : 949—Chev. Bot. 534. A very hard woody shrublet.
Mauritania: Tiris (Mar.)! Also in North Africa and the Eastern Mediterranean. Exsicc.—*Schmitt* in *Herb. Chev.* 28497. *Charles* in *Herb. Chev.* 25517.

9. SALICORNIA Linn.—F.T.A. 6, 1 : 86.

Leaves rounded, densely imbricate, forming a cone-like structure .. .. 1. *indica*
Leaves more or less triangular and slightly pointed, only slightly imbricate and not forming a cone-like structure .. .. 2. *herbacea*

1. **S. indica** *Willd.* in Ges. Nat. Fr. Neue Schr. 2 : 111, t. 4, f. 4. *S. fruticosa* A. Chev. Bot. 533, not of Linn. An erect shrubby perennial.
Senegal: St. Louis (May–June)! Common on maritime shores of the Northern Hemisphere. Exsicc.—*Chev.* 3524; 3525.
2. **S. herbacea** *Linn.* (sensu lato[1])—F.T.A. 6, 1 : 86. An erect glabrous annual.
Mauritania: various localities! Distribution about the same as preceding species.

34. AMARANTACEAE

Annual or perennial herbs, rarely undershrubs or climbers; leaves alternate or opposite, simple, exstipulate. Flowers actinomorphic, usually hermaphrodite, small, in spikes, heads or racemes, with often scarious bracts and bracteoles, the latter sometimes hooked. Sepals 3–5, free or nearly so, imbricate, more or less dry and membranous. Petals absent. Stamens mostly 5, opposite the sepals, hypogynous; filaments united at the base into a short tube, often with staminodes between; anthers 1- or 2-celled, opening by longitudinal slits. Ovary superior, 1-celled; style short or long; stigma capitate or 2–3-fid; ovules solitary or rarely several, on basal funicles. Fruit dehiscing by a lid or indehiscent. Seeds globose, compressed or ellipsoid, smooth; embryo annular, surrounding the copious endosperm.

Mainly in the tropics and subtropics, often occurring as weeds or escapes from cultivation. Recognised by the herbaceous habit, the alternate or opposite leaves without stipules, the small inconspicuous often scarious flowers without petals, the definite stamens shortly connate at the base, the 1-celled ovary, and annular embryo with endosperm.

Leaves alternate:
Flowers glabrous or nearly so; staminodes absent:
Ovules several; flowers hermaphrodite; bracts and calyx scarious **1. Celosia**
Ovule solitary; flowers polygamo-dioecious, the central flower of a cluster often perfect; bracts and calyx more or less herbaceous .. .. **2. Amaranthus**
Flowers accompanied by numerous soft woolly hairs, polygamous, monoecious or subdioecious; ovule solitary; staminodes present; calyx scarious **3. Aerva**

[1] We have only seen a small fragment from Chevalier's herbarium, but accept his determination, which is probably correct.

Leaves opposite :
Bracts of the sterile flowers (or some of them) ending in a hooked spine ; anthers 2-celled :
No staminodes present in the flowers .. .. **4. Pupalia**
Staminodes present between the stamens .. .. **5. Cyathula**
Bracts not ending in a hooked spine :
Anthers 2-celled :
Leaves sessile or subsessile ; spikes dense, globose or elongated, the flowers not becoming reflexed in fruit .. .. **6. Pandiaka**
Leaves petiolate ; spikes usually slender with laxly arranged flowers which mostly soon become sharply reflexed ; bracteoles mostly ending in a subulate spine **7. Achyranthes**
Anthers 1-celled :
Spikes terminal or terminating short lateral branchlets :
Succulent, glabrous ; maritime plants .. .. **8. Philoxerus**
Not succulent, hairy ; not maritime plants .. .. .. **9. Gomphrena**
Spikes sessile, axillary :
Fruits not or only slightly flattened ; maritime plants.. .. **10. Telanthera**
Fruits much flattened, winged ; not maritime .. .. .. **11. Alternanthera**

FIG. 45.—CELOSIA ARGENTEA *Linn.* (AMARANTACEAE).

A, flower.

B, the same opened out with ovary in vertical section.

C, stamens, front and back.

D, ovary with style.

E, the same in section.

F, fruit showing dehiscence.

G, seed cut lengthwise.

H, seed.

1. CELOSIA Linn.—F.T.A. 6, 1 : 16.

Spikes simple, continuous, very dense-flowered, elongated or narrowly pyramidal ; perianth-segments linear-lanceolate, almost 1 cm. long ; styles elongated, as long as the calyx, very shortly trifid at the apex ; leaves linear to linear-lanceolate **1.** *argentea*
Spikes compound and often interrupted, with short lateral clusters of flowers ; calyx-segments up to about 5 mm. long, oblong to oblong-elliptic ; styles short, distinctly lobed ; leaves more or less ovate :
Inflorescence crowded, 1·5–2 cm. broad ; calyx-segments about 5 mm. long ; style about ½ the length of the capsule .. .. **2.** *laxa*
Inflorescence rather lax, rarely over 1 cm. broad ; calyx-segments up to 3 mm. long ; style very short :
Styles 3-fid ; calyx-segments whitish .. .. **3.** *trigyna*
Styles 2-fid ; calyx-segments brownish .. .. **4.** *leptostachya*

1. **C. argentea** *Linn.*—F.T.A. 6, 1 : 17 ; Holl. 4 : 539. An erect branched annual, 2–4 ft. high ; flowering spike silvery-white, often pink-tinged.
From Liberia eastwards and south to Tanganyika, etc., probably introduced and naturalised. Also in Arabia, S.E. Asia and Malaya. (See Appendix).

2. **Celosia laxa** *Schum. & Thonn.*—F.T.A. 6, 1 : 18 ; Chev. Bot. 527. A herb, 2–4 ft., erect or decumbent. Common throughout the area. Extending to Ubangi-Shari-Chad, Congo, Angola and Uganda. (See Appendix).
3. **C. trigyna** *Linn.*—F.T.A. 6, 1 : 19 ; Holl. 4 : 540 ; Chev. Bot. 527. A straggling herb, 1–4 ft. in length. A common weed throughout the area, and elsewhere on the continent to South Africa ; also in Madagascar and Arabia. (See Appendix).
4. **C. leptostachya** *Benth.*—F.T.A. 6, 1 : 23. A straggling herb, 1–2 ft. or more in length. S. Nigeria: Lagos (May)! Fernando Po (Nov.)! Also in Cameroons and Congo. Exsicc.—*T. Vogel* 141.

2. AMARANTHUS Linn.—F.T.A. 6, 1 : 30.

Leaves with a pair of large axillary spines ; spikes elongated, mostly paniculate at the ends of the branches, with often globose clusters of flowers in the leaf-axils ; calyx-segments with sharp spiny tips ; capsule membranous, dehiscent 1. *spinosus*
Leaves without spines :
Spikes panicled at the ends of the branches, sometimes with a few simple spikes in the lower leaf-axils :
Calyx-segments and bracts with sharp spiny tips ; stems and main axis of inflorescence pubescent ; capsule smooth, membranous ; leaves large, up to about 15 cm. long .. .. 2. *caudatus*
Calyx-segments and bracts at most only mucronate ; stems and main axis of inflorescence glabrous ; fruit verrucose, herbaceous, indehiscent ; leaves up to 6 cm. long .. .. 3. *viridis*
Spikes short and axillary :
Fruit herbaceous, verrucose ; spikes all axillary .. .. 4. *Blitum*
Fruit membranous, smooth or nearly so ; spikes axillary and sometimes forming a dense cluster at the apex .. .. 5. *oleraceus*

1. **A. spinosus** *Linn.*—F.T.A. 6, 1 : 32 ; Holl. 4 : 541 ; Chev. Bot. 528. An erect weed, 1–3 ft. high. Common throughout the area and elsewhere in tropical Africa and India. (See Appendix).
2. **A. caudatus** *Linn.*—F.T.A. 6, 1 : 31 ; Holl. 4 : 541 ; Chev. Bot. 527. A cultivated herb, 1–3 ft. high. Common throughout the warmer parts of Africa ; of Asiatic origin. (See Appendix).
3. **A. viridis** *Linn.*—F.T.A. 6, 1 : 33 ; Holl. 4 : 542 ; Chev. Bot. 528. An erect weed, 1–3 ft. high, the leaves sometimes blotched.
French Sudan : Bilma (May)! Togo : Lome! N. Nigeria : Nupe! Sokoto (Nov.)! Katagum (July)! Bauchi Plateau! S. Nigeria : Lagos! Aguku! Widely distributed elsewhere in Africa and in other warm countries. Exsicc.—*Barter* 1055. *Warnecke* 295. *Thomas* 580 ; 771 ; 1093. (See Appendix).
4. **A. Blitum** *Linn.*—F.T.A. 6, 1 : 35 ; Holl. 4 : 541, as *A. polygamus* Linn. ; Chev. Bot. 527. *A. sylvestris* and *A. graecizans*, both of A. Chev. Bot. 528, not of Desf. or Linn. A much-branched small annual, erect or decumbent, 1 ft. or more in height ; leaves often pale beneath.
French Sudan : Lom (June)! Badumbe (Dec.) ; San (June)! Timbuktu (July)! Djenne (June)! Bilma! French Guinea : Kouroussa. Gold Coast : Accra! Togo : Lome! N. Nigeria : Nupe! Katagum (Jan., July)! Kuka (Jan.)! S. Nigeria : Onitsha! A common weed of waste places or in cultivated ground in all warm countries. Exsicc.—*E. Vogel* 21 ; 31. *Barter* 539 ; 1716 ; 1727. *Chev.* 1022 ; 1107 : 1285 ; 1364 ; 28623. *Warnecke* 363.
5. **A. oleraceus** *Linn.*—F.T.A. 6, 1 : 34. An erect herb, 1–2 ft. high.
Senegal! N. Nigeria : Mamu, 2,500 ft. (May)! A weed of all warm countries ; used as spinach.

3. AERVA Forsk.—F.T.A. 6, 1 : 37.

Inflorescence a terminal panicle of dense leafless long cylindric spikes ; leaves lanceolate, about 5–7 cm. long and 1·5–2 cm. broad, sometimes almost linear, lanate below ; bracts villous, membranous ; stems densely covered with stellate indumentum 1. *tomentosa*
Inflorescence very short and small, mostly axillary ; leaves glabrous or glabrescent ; stems thinly pubescent or glabrescent :
Leaves ovate-elliptic, acute, about 3–4 cm. long and 2–2·5 cm. broad, pubescent like the stems ; spikes fairly stout, about 4 mm. wide .. .. .. 2. *lanata*
Leaves lanceolate or oblong-lanceolate, 2–4 cm. long and up to 1·5 cm. broad, very thin and glabrous or nearly so like the stems ; spikes small and slender, hardly 2 mm. wide .. .. 3. *brachiata*

1. **A. tomentosa** *Forsk.*—F.T.A. 6, 1 : 37 ; Chev. Bot. 529, as *A. javanica* Juss. An erect or suberect undershrub, hoary-white, 2–4 ft. high ; in arid localities.
Mauritania : El Batha Tijrit (Jan.) ; Adrar. French Sudan : El Oualadji (July)! Timbuktu (July)! Agadem (Dec.)! Senegal : Richard Toll! Gambia! N. Nigeria : Sokoto (Nov.)! Katagum (July)! Kuka! Maigumeri (Nov.)! Benué R.! Tropical Africa and Asia generally. Exsicc.—*Chev.* 1174 ; 1286. *Dollinger* 11. *E. Vogel* 15. *Elliott* 124. *Chev.* 25525 ; 28570 ; 1174 ; 1286. (See Appendix).
2. **A. lanata** *Juss.*—F.T.A. 6, 1 : 39 ; Holl. 4 : 542 ; Chev. Bot. 530. A straggling undershrub ; waste places in villages, etc.
Sierra Leone : Talla (Feb.)! Ivory Coast : Bouroukrou (Dec., Jan.) ; Bingerville (Dec.). Gold Coast : Kumasi (Jan.)! Krobo (Dec.)! S. Nigeria : Lagos (Mar.)! Oban! Also in Cameroons, Ubangi-Shari-Chad, Angola, and trop. Asia. Exsicc.—*Sc. Elliot* 4865. *Dawodu* 38. *Dennett* 482. *Millen* 59 : 165. (See Appendix).
3. **A. brachiata** *Mart.*—F.T.A. 6, 1 : 40. An erect or straggling undershrub.
Senegal! N. Nigeria : Kuka (Jan.)! Also in Ubangi-Shari-Chad, Eastern Sudan, Angola, and in the Mascarene Islands and India. Exsicc.—*Heudelot* 239. *E. Vogel* 7.

4. PUPALIA Juss.—F.T.A. 6, 1 : 47.

A herb ; branches very shortly and softly pubescent ; leaves ovate, petiolate, abruptly cuneate at the base, acute at the apex, about 4–6 cm. long and 2–3·5 cm. broad, velvety-pubescent when young ; lateral nerves distinct ; inflorescence pedunculate,

FIG. 46.—PUPALIA LAPPACEA *Juss.* (AMARANTACEAE).

A, flower. B, bracts, inner and outer surface. C, sterile bracts. D, perianth-segments, inner and outer surface. E, stamens, front and back. F, ovary in vertical section. G, flower partially opened out. H, the same opened out with ovary in vertical section. I, hooked bracts of sterile flowers. J, fruit surrounded by bracts. K, fruit splitting. L, seed. M, seed cut longitudinally.

usually interrupted, especially in fruit; partial inflorescence sessile, armed with strong hooks .. .. *lappacea*

Pupalia lappacea *Juss.*—F.T.A. 6, 1 : 47; Chev. Bot. 529. A weed, 2–4 ft. high, with whitish flowers, yellow or red stamens, and burr fruits.
Common throughout the area, and elsewhere in the tropics of the Old World. (See Appendix).

5. CYATHULA Lour.—F.T.A. 6, 1 : 42.

Inflorescence a continuous dense spike 1·5–2 cm. broad; stems with slender reflexed hairs; leaves elliptic to ovate-elliptic, acute, 5–7 cm. long, 2·5–3·5 cm. broad, pilose; bracts broadly ovate, shining, with long sharp often hooked points 1. *Mannii*

Inflorescence slender, about 5 mm. broad, usually interrupted towards the base; stems becoming glabrate, pubescent with ascending hairs when young; leaves more or less rhomboid with a triangular apex, variable in size up to 10 cm. long and 5 cm. broad, slightly pubescent; calyx-segments strongly nerved, pubescent:

Partial inflorescence with usually two fertile flowers; flowers more or less ovoid 2. *prostrata*

Partial inflorescence with one fertile flower; flowers lanceolate 3. *achyranthoides*

1. **C. Mannii** *Baker*—F.T.A. 6, 1 : 46. A rambling herbaceous plant.
Fernando Po! Cameroons Mt., 7,000 ft. (Dec.)! Also in Central and East Africa. Exsicc.—*Mann* 296; 2007.
2. **C. prostrata** *Blume*—F.T.A. 6, 1 : 43; Chev. Bot. 529. *C. pedicellata* C. B. Clarke. *Pupalia atropurpurea* A. Chev. Bot. 529, not of Moq. Erect or suberect, herbaceous, 1–3 ft. high, with prickly burrs.
A common weed of waste places, throughout the area, extending to Congo and East Africa; also in the Mascarene Islands and S.E. Asia. (See Appendix).
3. **C. achyranthoides** *Moq.*—Chev. Bot. 528. *C. geminata* Moq.—F.T.A. 6, 1 : 44. Habit of the preceding.
French Sudan: Koulikoro (Oct.) Ivory Coast: Bingerville (Dec.); Bouroukrou (Dec., Jan.); Cavally Basin (July). N. Nigeria: Lokoja! Fernando Po (Nov.)! Also in Ubangi-Shari-Chad and Congo, and in tropical America. Exsicc.—*T. Vogel* 253. *Barter* (no number).

6. PANDIAKA Hook. f.—F.T.A. 6, 1 : 67.

Leaves lanceolate or ovate-lanceolate, sessile, subacute, up to 6 cm. long and 2 cm. broad; whole plant long-pilose; heads mostly somewhat rounded, rarely cylindric; floral leaves conspicuous .. .. 1. *involucrata*

Leaves linear, acute, subsessile, up to 7 cm. long and 5 mm. broad; whole plant sparingly-pubescent; heads at length cylindrical; floral leaves forming an involucre at the base .. .. 2. *Heudelotii*

1. **P. involucrata** *Hook. f.*—F.T.A. 6, 1 : 67. A hairy erect branched herb, 2–4 ft. high; flowers greenish-white, sometimes pink-tinged; on dry hills, rocky places, etc.
Gold Coast: Dukwesim, Ashanti (Dec.)! Togo! Dahomey! N. Nigeria: various localities, up to 4,000 ft. (Sept., Oct.)! S. Nigeria: Lagos! Abeokuta! Idah! Aguku! Also in Ubangi-Shari-Chad. Exsicc.—*Barter* 944. *T. Vogel* 138b.
2. **P. Heudelotii** *Hook. f.*—F.T.A. 6, 1 : 68; Chev. Bot. 530, as *Achyranthes angustifolia* Benth. and *A. Heudelotii* Moq. A long-branched hairy herb, 2–3 ft. high; anthers and tips of calyx often crimson.,
Senegal: Kaolak. French Guinea: Kouroussa (Feb.). Sierra Leone: Makunde (April)! Gold Coast: Accra! Togo: Lome! N. Nigeria: Nupe! Lokoja! Katagum (Sept.)! Bauchi Plateau, 3,000–4,500 ft. (Aug.)! Also in Ubangi-Shari-Chad, Congo, Angola and Eastern Sudan. Exsicc.—*Sc. Elliot* 5699. *Barter* 1724. *Warnecke* 182. *T. Vogel* 98. (See Appendix).

7. ACHYRANTHES Linn.—F.T.A. 6, 1 : 62.

Bracteoles ¼–½ as long as the calyx, ovate, acute, not elongated into a spine; stems conspicuously grooved, stout; leaves lanceolate to ovate, pilose below with appressed hairs when young; spikes about 6–10 cm. long, at length up to 20 cm. long, the flowers not very acutely reflexed in fruit; calyx-segments obtuse 1. *aquatica*

Bracteoles ½ as long as the calyx or more, with a short membranous base and terminating in a long subulate spine; stems slender; calyx-segments very acute:

Stems and leaves glabrous or nearly so; leaves linear, acute, 5–7 cm. long, 5–8 mm. broad; spikes slender, up to 10 cm. long; flowers sharply reflexed, about 4 mm. long; bracteoles about half the length of the calyx .. .. 2. *Talbotii*

Stems and leaves glabrous or nearly so; leaves broadly elliptic, abruptly acuminate, about 10–20 cm. long, 3–8 cm. broad; spikes up to about 15 cm. long; flowers reflexed; bracteoles as long or nearly as long as the calyx .. 3. *bidentata*

Stems and leaves pubescent or silky, especially when young; leaves ovate or ovate-lanceolate, acute, usually not more than 10 cm. long and 5 cm. broad; spikes often much elongated in fruit with the flowers sharply reflexed and contiguous with the axis; bracteoles ½–⅔ as long as the calyx .. .. 4. *aspera*

1. **A. aquatica** *R. Br.*—F.T.A. 6, 1 : 64; Chev. Bot. 530. A rather stout sparsely hairy herb of marshy places, rooting from the lower nodes, 2–4 ft. high.
Senegal: Kaédi (Dec.). N. Nigeria: Katagum (Oct.)! Also in N. Cameroons, Ubangi-Shari-Chad, Eastern Sudan, Abyssinia and India. Exsicc.—*Dalz.* 152. *Chev.* 3446.
2. **A. Talbotii** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. An erect herb, with narrow leaves.
S. Nigeria: Oban! Exsicc.—*Talb.* (no number).
3. **A. bidentata** *Blume*—F.T.A. 6, 1 : 64. An erect herb, 2–4 ft. high; leaves comparatively large, turning black-green in drying.
S. Nigeria: Oban! Johann-Albrechtshöhe! Fernando Po! Also in Angola, Central and East Africa, and in tropical Asia. Exsicc.—*Mann* (no number). *Staudt* 546.

4. **Achyranthes aspera** *Linn.*—F.T.A. 6, 1 : 63 ; Holl. 4 : 543. An erect herb, 1–4 ft. high ; calyx sometimes reddish.

A common weed of waste places ; found throughout the area and in the hotter parts of the Old World. (See Appendix).

Imperfectly known Species.

A. nodosa *Vahl*—F.T.A. 6, 1 : 65. We have not seen a specimen of this, which was collected by Isert at Whydah in Dahomey. It was supposed by Bentham to be a species of *Pandiaka*.

8. PHILOXERUS R. Br.—F.T.A. 6, 1 : 74.

A decumbent glabrous rather succulent herb ; leaves linear, slightly broader towards the apex, abruptly acute, amplexicaul at the base, up to 5 cm. long and 0·5 cm. broad, fleshy ; spikes sessile, ovoid to cylindrical, up to 2·5 cm. long, sometimes clustered ; bracts white, ovate-acute, about 3 mm. long, 1-nerved *vermiculatus*

P. vermiculatus *R. Br.*—F.T.A. 6, 1 : 75. *Iresine vermicularis* Moq.—Chev. Bot. 531. Root woody ; a sand binder.

Common on the coasts of Upper and Lower Guinea, and also on the coasts of the hotter parts of America.

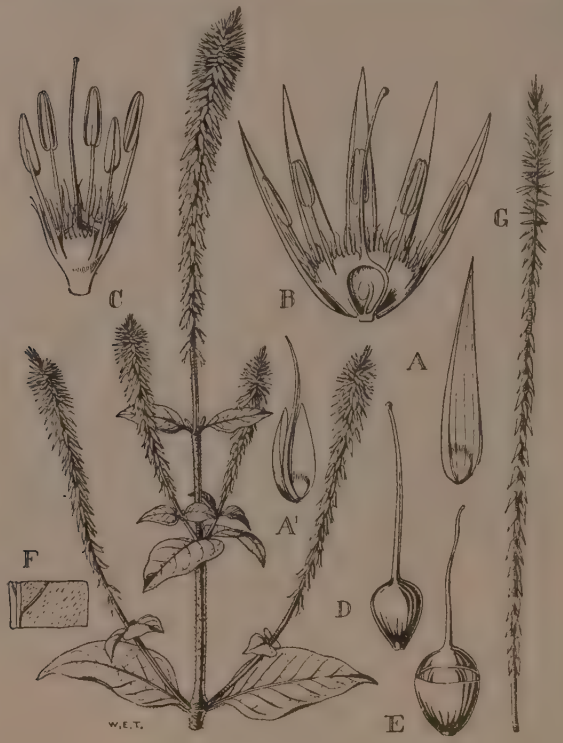

FIG. 47.—ACHYRANTHES ASPERA *Linn.* (AMARANTACEAE).

A, perianth-segment.

A¹, bracteole.

B, flower laid open with ovary in longitudinal section.

C, flower with perianth removed, showing stamens and fimbriate staminodes.

D, ovary with style.

E, fruit splitting.

F, portion of under surface of leaf.

G, flower-spike.

9. GOMPHRENA Linn.—F.T.A. 6, 1 : 75.

A hairy annual up to 1 m. high ; stems and branches contracted at the nodes ; leaves obovate-oblanceolate, shortly petiolate, very acute, about 5–8 cm. long and up to 3 cm. broad, pilose with long weak hairs ; spikes subglobose or rarely shortly cylindrical, up to 4·5 cm. long and 2 cm. broad, with an involucre of 2–3 foliage leaves, the bracts and flowers persisting, pink or yellow, the former with slightly toothed margins .. .. *globosa*

G. globosa *Linn.*—F.T.A. 6, 1 : 75 ; Holl. 4 : 544.

N. Nigeria : Sokoto (Nov.) ! S. Nigeria : Brass ! Cross River (Jan.) ! Calabar (April) ! Lagos (Sept.) ! Oban ! A native of S. America, cultivated as an ornamental plant, and a weed in the Old World.

10. TELANTHERA R. Br.—F.T.A. 6, 1 : 72.

A nearly glabrous decumbent branched herb ; stems rooting at the nodes ; leaves oblanceolate to obovate, mucronate, narrowed to the base, 3–5 cm. long, 1·5–3 cm. broad, with distinct lateral nerves ; flower-clusters axillary, ovoid, up to 1·5 cm.

long; bracts 1-nerved; calyx-segments strongly 3-nerved with membranous margins, acute .. .. *maritima*

Telanthera maritima *Moq.*—F.T.A. 6, 1 : 72; Chev. Bot. 530, as *Alternanthera maritima* St. Hil.
A sea-coast plant, common on the shores of Upper and Lower Guinea; also on the coast of S. America.

FIG. 48.—PHILOXERUS VERMICULATUS *R.Br.* (AMARANTACEAE).
A, the plant. B, flower opened out. C, perianth-segment. D, stamens, back and front. E, ovary cut vertically.

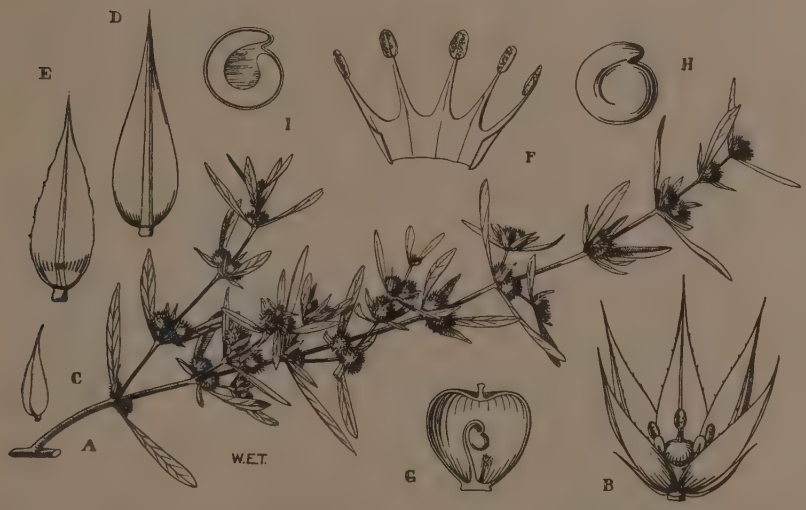

FIG. 49.—ALTERNANTHERA NODIFLORA *R.Br.* (AMARANTACEAE).
A, portion of the plant. B, flower. C, bracteole. D, E, perianth-segments. F, stamens. G, ovary in longitudinal section. H, seed. I, seed in longitudinal section.

11. ALTERNANTHERA Forsk.—F.T.A. 6, 1 : 72.

Leaves obovate or rounded-obovate, mucronate, entire, about 2–4 cm. long and 1–2 cm. broad, about 2-nerved on each side, pustulate and sparingly pubescent on the nerves; calyx-segments over 5 mm. long, acutely acuminate and becoming prickly in fruit .. .. 1. *repens*

Leaves linear-lanceolate, acute or subacute, obscurely undulate, up to 6 or 7 cm. long and 1 cm. broad, glabrous or nearly so, with several very obscure lateral nerves; calyx a little shorter and softer, but otherwise very similar to the preceding
.. 2. *nodiflora*

Leaves oblanceolate, obtuse, minutely denticulate, up to about 6 cm. long and nearly 2 cm. broad (usually much smaller), with about 5 lateral nerves on each side, glabrous or nearly so and often pustulate; calyx-segments acute, but hardly acuminate, 2–3 mm. long, not prickly in fruit .. .. 3. *sessilis*

1. **Alternanthera repens** *O. Ktze.*—F.T.A. 6, 1 : 74, as *A. echinata* Sm.; Chev. Bot. 530. A procumbent herb. French Sudan: Djenné (July). Senegal: Tamboukané (Dec.); Dakar (Jan.–April). French Guinea: Kouroussa (June)! Bammako (Feb.). Gold Coast: Cape Coast (July)! Mampon, Ashanti! Aburi! Togo: Lome! N. Nigeria: Sokoto! Nupe! S. Nigeria: Ibadan (Mar.)! Lagos! Also in Princes Isl., Congo, Angola, and extends to East and South Africa. Exsicc.—*T. Vogel* 37. *Barter* 852. *Poboguin* 296; 1708. *Warnecke* 279. *Cher.* 392. (See Appendix).

2. **A. nodiflora** *R. Br.*—F.T.A. 6, 1 : 73. *A. sessilis* R. Br. var. *nodiflora* O. Ktze.—Chev. Bot. 531. Rootstock often woody; branches procumbent.
Senegal: Mbidjem! Senegal R.! Kaédi. French Guinea: Kankan. N. Nigeria: Sokoto (Dec.)! Bauchi Plateau! Liruwen Kano Hills! R. Benue! Extends to Eastern Sudan and Abyssinia, Angola, S.W. Africa, Rhodesia and Nyasaland; also in India, Malaya and Australia. Exsicc.—*Heudelot* 130. *Thierry* 222. (See Appendix).

3. **A. sessilis** *R. Br.*—F.T.A. 6, 1 : 73; Stapf 644, Holl. 4 : 543, as *A. achyranthoides* Forsk.; Chev. Bot. 531. A decumbent herb, of moist places, stream-beds, etc.
Common throughout the area and elsewhere in tropical Africa; also a weed in S. Asia and Australia. (See Appendix).

35. BASELLACEAE

Twiners with slender stems and rather fleshy alternate entire petiolate leaves; stipules absent. Flowers hermaphrodite, actinomorphic, in spikes, racemes or panicles; bracts small; bracteoles 2, often united to the base of the calyx. Sepals 5, often coloured, almost free or united into a 5-lobed tube, imbricate, persistent in fruit. Petals absent. Stamens 5, inserted opposite and at the

FIG. 50.—BASELLA ALBA *Linn.* (BASELLACEAE).

A, flower-bract. B, flower laid open. C, stamen. D, ovary. E, the same in vertical section. F, flowering and fruiting spike. G, fruit. H, the same half-cut transversely.

base of the sepals; filaments free, short; anthers with 2 parallel cells opening longitudinally. Ovary superior, 1-celled, with a solitary basal shortly stalked ovule; style terminal, often deeply divided into 3 stigmas. Fruit indehiscent, surrounded by the persistent often fleshy calyx. Seed solitary, almost spherical, with a membranous testa; endosperm copious, surrounded by the spirally twisted embryo.

A small family, mostly in tropical South America, the genus *Basella* African and Asiatic, and often cultivated.

BASELLA Linn.—F.T.A. 6, 1 : 94.

Leaves alternate, entire. Spikes simple or branched, slender ; bracts small ; bracteoles 2, united into a two-lipped cup adnate to the calyx. Flowers small, hermaphrodite ; sepals 5, united into a fleshy tube, the lobes incurved over the fruit ; stamens 5, inserted near the top of the calyx-tube ; ovary ovoid.

Twiner, glabrous, with slender somewhat fleshy branches ; leaves broadly ovate, petiolate, widely cordate at the base, usually acutely acuminate, up to 10 cm. long and 7 cm. broad, with 4–5 pairs of lateral nerves ; spikes axillary, simple and slender or shorter and branched ; bracts broadly ovate, submembranous, acute, about half the length of the flower ; fruit enclosed by the persistent succulent calyx, broadly ovoid, almost 0·5 cm. long .. .. *alba*

B. alba *Linn.*—F.T.A. 6, 1 : 94 ; Holl. 4 : 545 ; Chev. Bot. 535. *B. rubra* Linn.—Chev. Bot. 535. A climber, cultivated in native gardens.
Sierra Leone : Kukuna, Scarcies ! Ivory Coast : Bouaké (July). Togo : Lome ! Dahomey : Djougou, 1,350 ft. (June). S. Nigeria : Lagos ! Cameroons Mt., 1,000 ft. (Dec.) ! Also in other parts of tropical Africa, Asia and the West Indies. Exsicc.—*Sc. Elliot* 4664. *Mann* 1250. *Kersting* 684. (See Appendix).

36. LINACEAE

Herbs, shrubs or trees. Leaves simple, alternate or opposite ; stipules present or absent, sometimes gland-like. Flowers hermaphrodite, actinomorphic. Sepals imbricate. Petals contorted, free, often clawed. Stamens the same number or double as many as the petals and alternate with them, sometimes with alternating small staminodes ; filaments connate at the base ; anthers 2-celled, opening lengthwise. Ovary superior, 3–5-celled, cells often again subdivided nearly to the placentas ; ovules 2 in each cell. Styles 3–5, filiform, free, with simple subcapitate stigmas. Fruit a septicidally dehiscent capsule. Seeds with copious or no endosperm, straight embryo and flat cotyledons.

A rather mixed family of various habit, from the common Flax (*Linum usitatissimum* Linn.) to trees or climbers. Petals mostly soon falling off.

Petiole of the leaf not jointed in the middle :
A tiny herb with opposite exstipulate leaves and very small flowers in leafy dichotomous cymes .. .. **1. Radiola**
Trees, shrubs or climbers ; leaves alternate, stipulate :
Styles 5, free to the base or nearly so ; stamens 10 ; petals soon falling off ; branchlets often hooked .. .. **2. Hugonia**
Style single, undivided ; stamens usually 5 ; petals persistent, becoming dry and subcoriaceous ; branchlets not hooked .. .. **3. Ochthocosmus**
Petiole of the leaf jointed in the middle ; flowers in short densely bracteate racemes ; doubtfully included in this family .. .. **4. Lepidobotrys**

1. RADIOLA Gmel.—F.T.A. 1 : 268.

A very small glabrous annual herb ; leaves opposite, ovate or elliptic, about 4 mm. long and 2–3 mm. broad ; flowers very small, numerous, in leafy dichotomous cymes ; sepals ovate, acute ; valves of the capsule tipped by the persistent styles *linoides*

R. linoides *Roth*—F.T.A. 1 : 268, as *R. Millegrana* Sm.
Cameroons Mt., 7,000 ft. (Nov.–Dec.) ! Also in Europe and N. Africa. Exsicc.—*Mann* 1334 ; 2021.

2. HUGONIA Linn.—F.T.A. 1 : 270.

Leaves when mature densely and softly tomentose all over the lower surface :
Leaves narrowed to the base, oblong-lanceolate, acutely acuminate, 8–12 cm. long, 3–4 cm. broad, crenulate-dentate ; lateral nerves about 12 pairs, looped very close to the margin, with distinct parallel tertiary nerves ; stipules persistent, tomentose, about 1 cm. long ; sepals densely villous ; ovary glabrous .. .. **1.** *Afzelii*
Leaves broadly rounded at the base, elliptic or ovate-elliptic, subobtuse at the apex, 15–20 cm. long, 5–9 cm. broad, distinctly crenate ; lateral nerves 12–15, tertiary nerves obscure ; stipules softly puberulous, subpersistent ; sepals shortly tomentose ; ovary hirsute ; fruit globose, about 1·5 cm. in diam. .. .. **2.** *spicata*
Leaves rounded at the base, acute and subabruptly acuminate at the apex, 9–14 cm. long, 5–7 cm. broad, coarsely crenate-dentate ; lateral nerves about 16, tertiary nerves obscure ; stipules subpersistent, woolly outside ; sepals woolly-tomentose outside ; ovary glabrous ; fruit obovoid, 2 cm. long, shining, glabrous
3. *Chevalieri*

Leaves glabrous when mature or only slightly pubescent or pilose mainly on the nerves below :

Leaves usually large, up to 30 cm. long, 8–10 cm. broad, very densely rusty-hirsute on the midrib above, obovate, shortly acuminate, narrowed to the very short hirsute petiole, pilose on the nerves below :

Lateral nerves about 16–20 pairs ; stipules with long filiform segments, plumose-pilose ; outer sepals densely rusty-villous ; flowers densely clustered amongst the stipular bracts .. .. 4. *macrophylla*

Lateral nerves 12–14 pairs ; stipules scarcely plumose-pilose ; flowers not seen ; leaves mucronate or very shortly acuminate .. .. .. 5. *rufopilis*

Leaves smaller, rarely more than 15 cm. long, glabrous or slightly pubescent on the midrib :

Stipules persistent during flowering ; leaves distinctly acutely acuminate :

Young leaves softly tomentose, at length glabrous, mature elliptic or oblong-elliptic, rounded or broadly cuneate at the base, abruptly acuminate, distinctly petiolate, 15–17 cm. long, 5–9 cm. broad, irregularly serrate ; lateral nerves about 14 pairs, with rather closely parallel tertiary nerves distinct on both surfaces 6. *foliosa*

Young leaves glabrous or nearly so, mature often slightly shining, oblanceolate to obovate, cuneate at the base, acutely acuminate, 10–15 cm. long, 3·5–6 cm. broad, crenulate, closely reticulate, midrib pubescent on both surfaces ; stipules with narrow subulate segments ; flowers 2–3 on a common peduncle in the axils of the leaves ; buds very pointed .. .. 7. *Planchonii*

Stipules early deciduous ; leaves rounded at the apex or very shortly acuminate :

Sepals conspicuously striate outside, the margins in the upper part revolute or recurved :

Leaves distinctly narrowed to the base, obovate or oblanceolate, obtuse, acute or very shortly acuminate, 10–14 cm. long, 3–7 cm. broad, slightly pubescent below, with numerous rather close lateral nerves ; flowers 3–4 on a common peduncle, rather long-pedicellate ; ovary glabrous except the apex 8. *platysepala*

Leaves slightly narrowed at the base, oblong or elliptic, obtuse at the apex, 7–10 cm. long, 3–5 cm. broad, softly tomentose below when young, becoming very minutely pubescent ; lateral nerves about 10 pairs, prominent below ; flowers mostly on simple pedicels less than 1 cm. long .. .. 9. *Baumannii*

Sepals neither striate nor recurved ; leaves obovate-oblanceolate, cuneate at the base, obtuse at the apex, 6–14 cm. long, 4–6 cm. broad, laxly reticulate on both surfaces, glabrous ; sepals very broadly rounded, slightly pubescent ; ovary pubescent .. .. 10. *obtusifolia*

1. **Hugonia Afzelii** *R. Br.*—F.T.A. 1 : 270. A climbing shrub with hoary-tomentose branches.
Sierra Leone ! Ivory Coast : Guidéko (May). Exsicc.—*Afzelius.*

2. **H. spicata** *Oliv.*—F.T.A. 1 : 270. A woody climber.
Fernando Po (Jan.) ! Exsicc.—*Mann* 224.

3. **H. Chevalieri** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *H. Afzelii* A. Chev. Bot. 93, not of R. Br. A shrub, 15–18 ft. high, with long loose branches.
Ivory Coast : Guidéko (May) ! Exsicc.—*Chev.* 16371.

4. **H. macrophylla** *Oliv.*—F.T.A. 1 : 271. An extensive woody climber ; leaves rather crowded at the ends of the branches.
S. Nigeria : Calabar (Mar.) ! Oban ! Degema ! Also in Gabon. Exsicc.—*Thomson* 78. *Talb.* (no number). *Holl.* 88.

5. **H. rufopilis** *A. Chev.* Bot. 93, name only. A small sarmentose shrub.
Ivory Coast : Bingerville, Abidjean, Dabou (Feb.) ! Exsicc.—*Chev.* 15443 ; 17266.

6. **H. foliosa** *Oliv.*—F.T.A. 1 : 271 ; Chev. Bot. 93. A woody climber.
Sierra Leone : Bagroo River (April) ! Ivory Coast : Bingerville ; between Byanouan and Soubiré (Mar.). Exsicc.—*Mann* 816.

7. **H. Planchonii** *Hook. f.*—F.T.A. 1 : 272 ; Chev. Bot. 93. *H. acuminata* A. Chev. Bot. 93, name only. A tree or widely climbing shrub.
Fairly common from French Guinea to Cameroons. Exsicc.—*T. Vogel* 27 ; 45. *Mann* 873. *Sc. Elliot* 4449 ; 5426. *Cook* 20 ; 71 ; 104. *Chev.* 13864. (See Appendix).

8. **H. platysepala** *Welw.*—F.T.A. 1 : 272 ; Chev. Bot. 93. A shrub, scrambling or erect, or sometimes a small tree.
French Guinea : Macenta, 2,000 ft. (May) ! Sierra Leone : various localities ! Ivory Coast : Bingerville ; Sanvi (Mar., April). Gold Coast : Krobo (June) ! S. Nigeria : Degema ! Fernando Po ! Also in Cameroons and Princes Isl., and extending to Angola, Congo, Upper Nile and Uganda. Exsicc.—*Mann* (no number). *Sc. Elliot* 5504 ; 5523 ; 5757. *Talb.* 3753. *Collenette* 11.

9. **H. Baumannii** *Engl.* Bot. Jahrb. 32 : 104. A lofty climbing shrub with pilose branches.
Togo : Misahöhe (May) ! Exsicc.—*Baumann* 530.

10. **H. obtusifolia** *C. H. Wright* in Kew Bull. 1911 : 119. A scrambling shrub.
S. Nigeria : Cross River ! Eket ! Also in Cameroons. Exsicc.—*Johnston. Talb.* (no numbers).

3. OCHTHOCOSMUS Benth.—F.T.A. 1 : 272, as *Phyllocosmus* Klotzsch.

Leaves acuminate, with black glandular teeth on the margin of the acumen, oblong lanceolate or obovate, acute at the base, 8–11 cm. long, 2–4 cm. broad, shining above ; lateral nerves few, ascending, with numerous obscure fine parallel tertiary nerves ; racemes of fascicles clustered, axillary, slender, up to 7 cm. long ; rhachis puberulous ; pedicels slender, fasciculate, 2–3 mm. long .. .. 1. *africanus*

FIG. 51.—HUGONIA PLANCHONII *Hook. f.* (LINACEAE).

A, stipule. B, flower-bud. C, flower. D, petal. E, flower after removal of sepals and petals. F, ovary with styles. G, fruit. H, cross-section of fruit.

Leaves rounded at the apex, shortly crenate-dentate nearly to the base, obovate-oblanceolate, acute or obtuse at the base, 8–15 cm. long, 2·5–6 cm. broad, rigidly coriaceous, dull or slightly shining, with about 10 pairs of rather obscure lateral nerves below and the tertiary nerves not evident; petiole swollen, transversely split; panicles clustered near the ends of the shoots, up to 15 cm. long; rhachis and pedicels glabrous, the latter 5 mm. long; flowers white, turning pink .. .. **2. *Chippii***

1. **Ochthocosmus africanus** *Hook. f.*—Fl. Nigrit. 240, t. 23. *Phyllocosmus africanus* Klotzsch—F.T.A. 1 : 273; Stapf 583; Chev. Bot. 94. A small tree or a shrub, with sarmentose branches; flowers very abundant, small, white, fragrant; capsules 1–2 seeded, 5–6 mm. long.
French Guinea: Conakry (Dec.). Sierra Leone: numerous localities! Liberia: Grand Bassa (Aug.)! Cape Palmas. Ivory Coast: Attié (Feb.); Bouroukrou (Dec.–Jan.); Sanvi (April); Sassandra port (May); between Taté and Tabou (Aug.). Gold Coast: Aburi (July). Also in Cameroons and Congo. Exsicc.—*Don. Brown. Sc. Elliot* 4665. *Dinklage* 2034. (See Appendix).
2. **O. Chippii** *Sprague & Hutch.* in Chipp List Gold Coast Trees, etc., 11, name only. *Phyllocosmus sessiliflorus* A. Chev. Bot. 94, not of Oliv. A shrub about 10 ft. high; flowers white, turning pink.
Gold Coast: Axim (April, July)! Princestown (April)! Also in Cameroons. Exsicc.—*Chipp* 171; 424. *Chev.* 12697.

4. LEPIDOBOTRYS Engl. Bot. Jahrb. 32 : 108 (1902).

A glabrous tree or shrub; stipules caducous; leaves oblong-elliptic, more or less abruptly caudate-acuminate, rounded at the base, 6–10 cm. long, 3–4·5 cm. broad,

FIG. 52.—LEPIDOBOTRYS STAUDTII *Engl.* (LINACEAE).

A, base of leaf and petiole showing joint. B, flower-bud. C, sepal. D, petal. E, F, stamens. G, rudimentary ovary. H, open flower. I, longitudinal section of same. J, inflorescence. K, longitudinal section of same.

papery, entire, with about 5 pairs of lateral nerves; petiole jointed in the middle; flowers in very short catkin-like densely bracteate racemes; pedicels 5–6 mm. long, jointed near the apex; sepals and petals 5; stamens 10, slightly connate at the base; only rudimentary ovary seen, but according to Engler 3-celled with 2 collateral pendulous ovules in each cell .. .. ***Staudtii***

L. Staudtii *Engl.* Bot. Jahrb. 32 : 108.
S. Nigeria: Johann-Albrechtshöhe, in the forest! Also in French Cameroons. Exsicc.—*Staudt* 911.
The leaves, with their conspicuously jointed petioles, are probably unifoliolate, a condition hitherto unknown in the *Linaceae*. Further study with better material may show this to be the type of a new family.

37. ZYGOPHYLLACEAE

Shrubs or herbs woody at the base, rarely trees; branches often jointed at the nodes. Leaves opposite or alternate, 2-foliolate or pinnate, rarely 3-foliolate, not gland-dotted; stipules paired, persistent, often spinescent. Flowers hermaphrodite, actinomorphic or zygomorphic. Sepals 5, rarely 4, free or rarely connate at the base, imbricate, rarely valvate. Petals 4–5, rarely absent, hypogynous, free, imbricate or contorted, rarely valvate. Disk mostly present.

FIG. 53.—TRIBULUS TERRESTRIS *Linn.* (ZYGOPHYLLACEAE).

A, root. B, leaf-bases with stipules. C, flower-bud. D, flower open. E, sepal. F, petal with 3 stamens. G, style with adnate stigmas. H, flower with sepals and petals removed. I, ovary with tubercles and spines. J, the same in cross-section. K, fruit from above. L, vertical section of a fruiting carpel.

Stamens the same number to three times the number of the petals, often unequal in length ; filaments free, often with a scale inside ; anthers 2-celled, opening lengthwise. Ovary superior, sessile or rarely stipitate, usually 4–5-celled ; cells rarely transversely locellate ; style simple, short, or stigmas sessile : ovules 2 or more in each cell, axile. Fruit various but never baccate. Seeds mostly with some endosperm ; embryo as long as the seed, straight or slightly curved.

Mainly in the tropics and subtropics, often in the drier parts. Recognised by the jointed stems, 2-foliolate or pinnate leaves and paired stipules.

Petals present ; stamens 10 :
Leaves pinnate, anisophyllous ; filaments without a scale at the base ; fruit spiny, muricate or winged, depressed .. .. 1. **Tribulus**
Leaves 1–3-foliolate :
Fleshy maritime shrub ; filaments with a scale at the base ; fruits sharply 5-angled, ellipsoid, opening lengthwise .. .. 2. **Zygophyllum**
Diffuse woody spiny annual ; filaments without a scale at the base ; fruits pyramidal, opening from below into 5 one-seeded cocci, tipped by the persistent style 3. **Fagonia**
Petals absent ; stamens 5 ; leaves trifoliolate ; filaments without a scale ; fruits broadly ellipsoid, the carpels separating and exposing the smooth crustaceous endocarp .. .. 4. **Seetzenia**

1. TRIBULUS Linn.—F.T.A. 1 : 283.

Fruits spiny or ribbed and muricate, not winged :
Fruits pyramidal, ribbed, beaked by the persistent style ; fruiting pedicels about 2 cm. long, strongly ribbed and thickened upwards ; opposite leaves unequal, the larger with 3 pairs of leaflets, the smaller usually with only 2 pairs, becoming thinly pilose .. .. 1. **maximus**
Fruits depressed, each carpel with two large rigid divergent spines and a few tubercles, thinly setose-pilose ; fruiting pedicels about 1 cm. long, stout ; opposite leaves unequal, the larger with 6–8 pairs of leaflets, the smaller with usually 5 pairs, thinly villous-pilose .. .. 2. **terrestris**
Fruits winged, depressed, pilose ; wings sharply toothed ; style deciduous ; fruiting pedicels 1–1·5 cm. long, not ribbed, thinly pilose ; opposite leaves similar to the preceding species .. .. 3. **alatus**

1. **T. maximus** *Torr. & Gray* F.T.A. 1 : 284. A spreading herb of waste places ; flowers pale yellow to whitish.
Gold Coast : Cape Coast (July) ! S. Nigeria : Lagos (June) ! A tropical American weed. Exsicc.—*T. Vogel* 58. *Dalz.* 1039.
2. **T. terrestris** *Linn.*—F.T.A. 1 : 283 ; Chev. Bot. 96. *T. saharae* Chev. Bot. 96, name only. Like the preceding, woody below ; flowers smaller and bright yellow ; a pest of footpaths and fields.
Common throughout the tropical and warm temperate regions of the world. (See Appendix).
3. **T. alatus** *Del.*—F.T.A. 1 : 284 ; Chev. Bot. 96. Habit of the preceding.
Mauritania : Adrar (Aug.) ! Across North Africa to India. Exsicc.—*Chev.* 28508.

2. ZYGOPHYLLUM Linn.—F.T.A. 1 : 285.

A fleshy maritime shrublet with short internodes ; leaves opposite, bifoliolate, leaflets narrowly obovate, rounded at the apex, 1·5–2 cm. long, shortly pubescent ; petiole thick, about 1·5–2 cm. long ; flowers solitary or paired ; pedicel about 0·5 cm. long, stout ; sepals broadly elliptic, pubescent, with glabrous membranous margins, 3–4 mm. long ; petals slightly longer, obovate ; fruits sharply 5-angled, oblong-ellipsoid, about 8 cm. long, slightly transversely ridged when dry ; seeds 2 in each coccus, angular, black .. .. *Fontanesii*

2. **Fontanesii** *Webb & Berth.* Phytog. Canar. 3, 1 : 17, t. 1—Chev. Bot. 97.
Mauritania : Port Étienne and environs (Feb., Mar.). In North Africa, Canary and Cape Verde Islands. Exsicc.—*Chev.* 25413 ; 25427 (not seen).

3. FAGONIA Linn.—F.T.A. 1 : 286.

A diffuse woody spiny annual, puberulous-glandular or nearly glabrous ; leaves very variable, 1–3-foliolate, opposite, leaflets linear to lanceolate, acute, with a callous tip, bright green, up to 2 cm. long ; stipules spinose, often longer than the leaves, very acute ; flowers solitary, axillary ; pedicels nearly 0·5 cm. long ; sepals ovate, very acute, 3 mm. long ; petals more than twice the length of the sepals, rose or lilac, narrowly clawed ; fruit pyramidal, shortly pubescent, about 0·5 cm. long, tipped by the hard persistent style, opening from below into five 1-seeded cocci *cretica*

F. cretica *Linn.*—F.T.A. 1 : 287 ; Chev. Bot. 97, as *F. Bruguieri* DC. and *F. glutinosa* Del. A desert plant: sometimes forming meadows in hollow places.
Mauritania : Tiris, Adrar, Tijirit (Jan.). Throughout the warmer dry parts of the world. Exsicc.—*Chev.* 25537 ; 28574 (not seen).

4. SEETZENIA R. Br.—F.T.A. 1 : 287.

Prostrate herb from a woody base ; branches glabrous, except the slightly hairy nodes ; leaves trifoliolate, opposite, shortly petiolate ; leaflets obovate, the lateral oblique, callous-mucronate, about 6–8 mm. long, glaucous and rather fleshy ; stipules small, interpetiolar, reflexed ; flowers solitary, axillary ; pedicel nearly 1 cm. long ; sepals oblong, subacute, 3–4 mm. long, glabrous ; fruits broadly ellipsoid, about 8 mm. long, the carpels separating lengthwise and gradually exposing the smooth crustaceous endocarp ; seeds minutely pitted .. .. *africana*

S. africana *R. Br.*—F.T.A. 1 : 287. *S. orientalis* Decne.—Chev. Bot. 97.
Mauritania : Adrar (Feb.). Extends to Egypt, Arabia and India. Exsicc.—*Chev.* 25526 ; 25551 ; 28485 (not seen).

38. GERANIACEAE

Annual herbs or undershrubs, rarely arborescent ; leaves alternate or opposite, mostly lobate, dissected or compound ; stipules often paired. Flowers often handsome, hermaphrodite, actinomorphic or slightly zygomorphic, axillary,

Fig. 54.—Geranium simense *Hochst.* (Geraniaceae).

A, segment of leaf. B, stipule. C, sepals, inner and outer face. D, petal. E, stamens. F, flower with sepals and petals removed. G, flower. H, ovary with sepals. I, fruit open. J, seed.

solitary to subumbellate. Sepals persistent, 4–5, free or connate to the middle, imbricate or rarely valvate, the dorsal one sometimes spurred. Petals 5, rarely 4, very rarely absent, hypogynous or subperigynous, imbricate, rarely contorted. Stamens 2–3 times the number of the sepals, sometimes a few without anthers ; filaments mostly more or less connate at the base ; anthers 2-celled, opening lengthwise. Ovary 3–5-lobed ; ovules 1–2 in each cell, superposed, pendulous, rarely more than 2. Fruit lobed ; lobes 1-seeded, rarely more-seeded, often beaked, opening from the base upwards. Seeds pendulous, with thin or no (rarely copious) endosperm and mostly curved or folded embryo.

A cosmopolitan family, numerous in temperate and subtropical regions ; leaves stipulate ; petals mostly imbricate ; fruits often with long beaks and deeply lobed at the base.

Stamens 15, united into 5 bundles ; leaves (in our species) ovate or lanceolate, denticulate .. .. **1. Monsonia**
Stamens 10, free or slightly connate at the base ; leaves (in our species) digitately divided .. .. **2. Geranium**

1. MONSONIA Linn.—F.T.A. 1 : 289.

A herb, woody at the base; leaves opposite, anisophyllous, ovate, cordate, acute, repand-denticulate, 2–3 cm. long, 1·5–2 cm. broad, 7–9-nerved at the base, nerves ending in the teeth, pale and slightly pubescent beneath on the nerves; petiole about 1½ times as long as the leaf; stipules interpetiolar, long-subulate, about 8 mm. long; flowers solitary, pink; peduncle 4–5 cm. long, with a pair of subulate bracts below the middle, becoming sharply bent at that point in fruit; sepals silky-pilose, abruptly caudate-acuminate; fruits about 7–8 cm. long .. .. 1. *senegalensis*

A hoary herb with a long woody underground stem; leaves opposite, anisophyllous, ovate-lanceolate, rounded at the base, subacute, about 1·5 cm. long, crenate, villous on both surfaces, with prominent lateral nerves; petiole as above; stipules lanceolate, 4 mm. long; flowers umbellate on a long slender straight peduncle with several bracts; sepals silky, mucronate; fruits 4 cm. long, splitting into slender plumose segments .. .. 2. *nivea*

1. **M. senegalensis** *Guill. & Perr.*—F.T.A. 1 : 290.
Senegal: Mbidjem! N. Nigeria: Katagum (Sept.)! Across to Abyssinia, Egypt and Western India; also to S.W. Africa, Ngamiland and Transvaal. Exsicc.—*Perrottet & Leprieur. Dalz.* 60.

2. **M. nivea** *Webb* Fragm. Fl. Aethiop. 59—Chev. Bot. 98.
French Sudan: Bilma (Feb.). Mauritania to Egypt. Exsicc.—*Chev.* 28642 (not seen).

2. GERANIUM Linn.—F.T.A. 1 : 290.

Stems slender, more or less procumbent, densely pilose or glabrescent; leaves up to 3·5 cm. in diam., digitately divided to below the middle, lobes acutely serrate-crenate, spreadingly pilose on the nerves below; petiole sometimes elongated to 12 cm. long; stipules broad, ovate-lanceolate, acute, about 1 cm. long and nearly 0·5 cm. broad, papery, with rather faint longitudinal nerves; flowers paired on a long peduncle; pedicels up to about 3 cm. long; sepals broadly lanceolate, with long subulate tips; petals purplish veined; fruits pilose, otherwise smooth .. .. 1. *simense*

Stems erect, up to 4 ft. high, weakly pilose with gland-tipped hairs; leaves about 3 cm. in diam., digitately divided to about the middle, lobes deeply and irregularly toothed, thinly pilose below; petiole up to 4 cm. long; stipules subulate-lanceolate, about 3–4 mm. long; flowers either on simple very short pedicels or paired on a short peduncle; sepals narrowly ovate, acuminate, pilose; petals purplish; fruits faintly transversely lined .. .. 2. *brevipes*

1. **G. simense** *Hochst.*—F.T.A. 1 : 291, incl. vars. *glabrius* Oliv. and *repens* Oliv. A diffusely branched herb; flowers pale pinkish to magenta with dark centre.
Cameroons Mt., 7,000–9,000 ft. (Jan., Nov.)! Fernando Po, 8,500 ft. (Dec.)! Extends to Abyssinia and Arabia, Uganda, Nyasaland, etc. Exsicc.—*Mann* 619; 1323; 1966.

2. **G. brevipes** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *G. favosum* Hochst. var. *sublaeve* Oliv.—F.T.A. 1 : 292. An erect herb.
Cameroons Mt., 7,000 ft. (Dec.)! Exsicc.—*Mann* 1261.

39. OXALIDACEAE

Herbaceous or suffrutescent, rarely arborescent. Leaves alternate, digitately or pinnately compound, sometimes simple by suppression of the leaflets; leaflets spirally coiled when young, usually closing at night; stipules absent. Flowers hermaphrodite, actinomorphic, sometimes of two kinds, some perfect and others minute and apetalous, solitary or subumbellate, rarely racemose or cymose. Calyx 5-fid or 5-partite, imbricate. Petals 5, shortly clawed, free or shortly connate at the base, contorted. Stamens 10, hypogynous, connate at the base, sometimes 5 of them without anthers; anthers 2-celled, opening lengthwise. Ovary 5-celled, superior; styles 5, free, persistent; stigmas capitate or shortly divided; ovules 1 or more, axile. Fruit mostly a capsule. Seeds often with an elastic epidermis; endosperm fleshy, copious; embryo straight.

A small family but rich in species, very numerous in the drier parts of South Africa; leaves sometimes sensitive; petals contorted; stamens double the number of the petals; styles free.

Leaves trifoliolate; valves of the fruit persisting around the central axis; leaflets obcordate; leaves not sensitive to touch .. .. 1. **Oxalis**

Leaves pinnate; valves of the fruit finally spreading; leaflets not obcordate; leaves sensitive to touch .. .. 2. **Biophytum**

1. OXALIS Linn.—F.T.A. 1 : 295.

A variable diffuse slender herb with fibrous root; stems pubescent; leaves trifoliolate, long petiolate, leaflets deeply obcordate, cuneate, slightly pubescent, about 1 cm. long or less; flowers yellow, usually paired on a long peduncle often sharply bent

FIG. 55.—BIOPHYTUM APODISCIAS *Edgew. & Hook. f.* (OXALIDACEAE).

A, leaf. B, flower-cluster. C, sepals, inner and outer face. D, flower. E, the same opened out. F, cross-section of ovary. G, fruit with sepals. H, capsule open. I, seed from the side. J, the same, face view.

towards the top in fruit ; fruit tomentellous, 1·5–2 cm. long ; seeds transversely rugose, purplish-brown .. .. *corniculata*

Oxalis corniculata *Linn.*—F.T.A. 1 : 296 ; Chev. Bot. 98.
A weed of waste ground in most warm countries.

2. BIOPHYTUM DC.—F.T.A. 1 : 297, under *Oxalis* Linn.

Annual with a nude slender simple stem ; leaflets up to about 10 pairs, obliquely oblong-obovate, rounded at each end, the largest about 1 cm. long, with prominent lateral nerves spreading at right angles ; rhachis pilose ; flowers sometimes on simple very short pedicels, sometimes on a common peduncle a little longer than the leaves ; bracts long-acuminate ; sepals lanceolate, long-acuminate, 5–6 mm. long, prominently 5-nerved ; fruits hardly as long as the persistent sepals .. .. 1. *Apodiscias*

Perennials ; stem woody, often branched at the top ; leaflets more numerous than in preceding :

Leaflets oblong, very oblique and auriculate on one side at the base, subacute, 1–1·4 cm. long, about 4 mm. broad, with numerous close parallel lateral nerves distinct only on the lower surface ; upper part of stem with tufts of hairs ; peduncle very short, with long filiform bracts ; flowers shortly pedicellate, pedicel shortly pubescent ; sepals linear-lanceolate, long-acute .. .. 2. *Talbotii*

Leaflets broadly oblong-ovate, rounded and oblique at the base, rounded at the apex, about 5 mm. long and nearly as much broad, with very faint few lateral nerves below ; upper part of stem hairy and also clad with the persistent tubercle-like bases of the leaves ; peduncle mostly slightly longer than the leaves ; bracts subulate, short ; sepals lanceolate, very acute, 5 mm. long, about 7-nerved ; fruits distinctly shorter than the sepals .. .. 3. *Zenkeri*

1. **B. Apodiscias** *Edgew. & Hook. f.* in Fl. Brit. Ind. 1 : 437—Guillaumin in Bull. Mus. Hist. Nat. Par. 15 : 124 ; Chev. Bot. 98. *Oxalis sensitiva* Oliv.—F.T.A. 1 : 297, not of Linn. Stem slender, very short or up to 1 ft. high ; leaves in a terminal crown, sensitive to weather and to touch ; flowers pale orange to red.
A common weed throughout the area and elsewhere in the tropics of the Old World. (See Appendix).
2. **B. Talbotii** *Bak. f.* in Cat. Talb. Nig. Pl. 16. Stem up to about 1 ft.
S. Nigeria : Calabar ! Oban ! Exsicc.—*Thomson* 24. *Talb.* 1409.
3. **B. Zenkeri** *Guillaumin* l.c. 128. Stem stout, short or up to 1 ft.
S. Nigeria : Oban ! Also in Cameroons and south to Angola. Exsicc.—*Talb.* 429.

40. BALSAMINACEAE

Succulent herbs ; leaves alternate or opposite, simple, penninerved ; stipules absent. Flowers zygomorphic, hermaphrodite, brightly coloured, solitary to subumbellate. Sepals 3, rarely 5, coloured, imbricate, unequal, the lowermost hollowed out into a spur. Petals 3, the upper one outside, usually erect, concave, the lateral ones often 2-lobed. Stamens 5 ; filaments short and broad ; anthers 2-celled, connate around the ovary. Ovary superior, 5-celled, with axile placentas ; stigmas 1–5, more or less sessile ; ovules numerous. Fruit a succulent capsule, opening elastically into 5 twisted valves. Seeds without endosperm and with straight embryo.

Mostly Asiatic, several in Africa, a few in Europe and North America. Recognised by the zygomorphic brightly coloured flowers with spurred lower sepal and connate anthers.

IMPATIENS Linn.—F.T.A. 1 : 298.

Characters of the family.

Flowers on simple pedicels in the axils of the leaves :

Spur bent round on itself, broadly tubular-campanulate in the upper half, about 3 cm. long ; stems glabrous ; leaves elliptic-lanceolate, acute at each end, long-petiolate, 10–15 cm. long, 3–5 cm. broad, glabrous, crenate, teeth with subulate points almost in the crenatures, becoming longer towards the base and on the petiole ; pedicels slender, about 4 cm. long .. .. 1. *dichroa*

Spur nearly straight or curved, or very shortly reflexed at the tip, slender, gradually widened upwards :

Spur much longer than the limb of the flower :

Spur pubescent especially in the upper wider part, about 3–4 cm. long, gradually tapered to the tip ; stem and lower surface of the leaves clothed with short rusty indumentum ; leaves shortly petiolate, elliptic-lanceolate, acute at each end, 8–10 cm. long, 2–3 cm. broad, serrulate, the teeth extending on to the petiole ; pedicels about 3·5 cm. long .. .. 2. *villoso-calcarata*

Spur glabrous, slender, curved, about 3 cm. long ; stem and lower leaf-surface glabrous ; leaves shortly petiolate, lanceolate, subacute at both ends, about 12–15 cm. long, 2–3·5 cm. broad, serrulate, the teeth extending to the petiole ; pedicels very slender, about 4–5 cm. long, sometimes pubescent .. 3. *Irvingii*

Spur as long as or shorter than the limb of the flower :
Spur pubescent in the upper wider part ; stems pubescent :
Stems erect, 2–3 ft. high, not rooting at the nodes ; leaves 10–12 cm. long, crenate 4. *Burtonii*
Stems prostrate, rooting freely at the nodes ; leaves 3–5 cm. long, obsoletely toothed .. .. 5. *Deistelii*
Spur glabrous ; stems glabrous :
Spur 3–3·5 cm. long .. .. 6. *nzoana*
Spur about 1 cm. long :
Midrib pubescent below ; spur not mottled or barred in the upper part 7. *affinis*
Midrib glabrous below ; spur barred or mottled-purple in the upper part 8. *Mannii*

Flowers subumbellate or racemose on a common peduncle :
Spur at the tip abruptly reflexed on itself, about 3 cm. long, glabrous ; leaves ovate-elliptic, rounded at the base, acutely acuminate, 8–12 cm. long, 4–5 cm. broad, glabrous, crenate, the teeth becoming cilia towards the base ; petiole very slender, 3–6 cm. long ; racemes up to about 12 cm. long ; bracts lanceolate, about 4 mm. long ; pedicels 1–2 cm. long .. .. 9. *hians*

FIG. 56.—IMPATIENS IRVINGII *Hook. f.* (BALSAMINACEAE).

A, flower. B, flower in partial longitudinal section. C, longitudinal section of flower with sepals and petals removed. D, young fruit. E, cross-section of ovary. F, seed. G, embryo.

Spur at most sharply curved at the tip :
Spur thickened or club-shaped at the tip :
Leaves opposite, long-petiolate, petioles and nerves of the leaves rusty pubescent, blades elliptic or ovate-elliptic, cuneate at the base, acutely acuminate, 8–16 cm. long, 3–6 cm. broad, deeply crenate with subulate teeth ; peduncle up to 10 cm. long ; pedicels 1·5–2 cm. long ; bracts narrowly lanceolate .. 10. *Sakeriana*
Leaves alternate, glabrous, long-petiolate, ovate, abruptly cuneate at the base, acutely acuminate, 8–15 cm. long, 5–9 cm. broad, crenate with subulate teeth ; peduncle 10–12 cm. long ; pedicels subumbellate, about 2 cm. long ; bracts oblong or ovate, leafy .. .. 11. *macroptera*
Spur very slender and not thickened towards the tip :
Racemes elongated, many-flowered ; leaves alternate .. .. 12. *Talbotii*
Racemes subumbellate with more or less foliaceous bracts :
Leaves alternate, ovate-elliptic, cuneate and subequal at the base, setulose-crenate ; bracts crowded .. .. 13. *filicornu*
Leaves opposite, ovate-elliptic, rounded and often very unequal-sided at the base, serrulate ; bracts not crowded .. .. 14. *kamerunensis*
Leaves alternate, oblong-lanceolate, rounded at the base, gradually acute at the apex, coarsely crenate ; bracts not crowded .. .. .. 15. *Preussii*

1. **Impatiens dichroa** *Hook. f.* ex *Gilg* in Engl. Bot. Jahrb. 43 : 104. *I. bicolor* Hook. f., not of Royle—F.T.A. 1 : 299. Stem 1–3 ft., woody below ; flowers green and white, the spurred sepal forming a long purple sac.
Cameroons Mt., 3,500 ft. (Feb.) ! Fernando Po, 4,000 ft. (Dec.) ! Also in Spanish Guinea. Exsicc.—*Mann* 574 ; 1248.
2. **I. villoso-calcarata** *Warb. & Gilg* ex *Gilg* l.c. 115. *I. guineensis* A. Chev. and *I. Irvingii* Hook. f. var. *setifera* A. Chev. Bot. 98–99. Herbaceous ; flowers red or pink.
French Guinea : ? locality ! Konakry and Iles de Los (Feb.) ! Kindia (Mar., Nov.) ! Sierra Leone : Samu (Dec.) ! Ivory Coast : Dyola country (May) ! S. Nigeria : Lagos Colony ! Also in Cameroons and Ubangi-Shari-Chad. Exsicc.—*Sc. Elliot* 4300. *Farmar. Chev.* 12084 ; 13085 ; 13122 ; 13153 ; 13376 ; 20810 ; 21541.
3. **I. Irvingii** *Hook. f.*—F.T.A. 1 : 300 ; Chev. Bot. 99. Herbaceous, 2–4 ft., half aquatic ; flowers uniformly red or pink ; leaves peculiarly greyish-tinted below.
French Guinea : Ditinn (April) ; Faranna (Jan.) ; Guerzé country (Mar.) ; Konanké country (Feb.) ; Sierra Leone : Kaballa (Sept.) ! Fundenbaia (Oct.) ! Ivory Coast : Grabo (July) ; Mankono (July) ; Man (May). Dahomey : Avrankou lagoon (Jan.). S. Nigeria : Abeokuta ! Crado Lake ! Lagos Colony ! Ilaro (Jan.) ! Anglama ! Brass ! Obu ! Also in Cameroons, Ubangi-Shari-Chad and Eastern Sudan. Exsicc.—*Barter* 102 ; 3257 ; 20135. *Millen* 123. *Thomas* 423 ; 2333 ; 2854.
4. **I. Burtonii** *Hook. f.*—F.T.A. 1 : 299. Herbaceous, 2–3 ft. high, glabrous in the lower part.
Cameroons Mt., 3,000 ft. (Jan., Dec.) ! Exsicc.—*Mann* 1247 ; 1952.
5. **I. Deistelii** *Gilg* l.c. 108. Prostrate herb rooting at the nodes ; flowers pale rose.
Cameroons Mt. : Buea (June) ! Exsicc.—*Deistel* 659.
6. **I. nzoana** *A. Chev.* in Bull. Soc. Bot. Fr. 58, Mém. 8d : 143 (1912). A glabrous herb, simple or branched, up to 2 ft. ; flowers pale rose ; in rocky streams.
Ivory Coast : source of river Nuon, Nzo, 1,500–2,400 ft. (April) ! Exsicc.—*Chev.* 21113.
7. **I. affinis** *Warb.* in Engl. Bot. Jahrb. 22 : 52. Erect herb ; flowers, stem and upper surface of leaf glabrous ; leaves with a small point in each indentation.
Cameroons Mt. : Buea, 2,850–6,000 ft. (May) ! Fernando Po, 4,000 ft. (April) ! Exsicc.—*Mann* (no number). *Preuss* 583.
8. **I. Mannii** *Hook. f.*—F.T.A. 1 : 300. Herbaceous, 2–3 ft., creeping at the base ; flowers light-red, becoming purplish in drying.
Cameroons Mt., 3,000 ft. (Dec.) ! Fernando Po, 2,000–4,000 ft. (Dec., April) ! Exsicc.—*Mann* 585 ; 1258 ; 1953 ; 1954.
9. **I. hians** *Hook. f.*—F.T.A. 1 : 301. Herbaceous, erect, 2 ft. ; flowers dark-red and greenish.
Fernando Po, 1,300–2,000 ft. (Dec.) ! Also in Cameroons. Exsicc.—*Mann* 309 ; 586.
10. **I. Sakeriana** *Hook. f.*—F.T.A. 1 : 301. Herbaceous, erect, 6–8 ft. ; flowers orange-red and yellow, the spur dark red ; flowering in some places nearly all the year.
Cameroons Mt., 7,000 ft. ! Exsicc.—*Mann* 1256 ; 1970.
11. **I. macroptera** *Hook. f.*—F.T.A. 1 : 301. Herbaceous, erect, 2–4 ft. ; flowers green and white or purplish.
S. Nigeria : Victoria (Nov.). Cameroons Mt. : between Boana and Buea, 2,400 ft. (Aug.). Fernando Po, 4,000–5,000 ft. (April) ! Also in French Cameroons and Spanish Guinea. Exsicc.—*Mann* 385 ; 1451.
12. **I. Talbotii** *Bak. f.* in Cat. Talb. Nig. Pl. 17. A glabrous herb, a foot or more high ; flowers bluish-purple when dried.
S. Nigeria : Oban ! Exsicc.—*Talb.* 430.
13. **I. filicornu** *Hook. f.*—F.T.A. 1 : 302. *I. Baumannii* Warb. Herbaceous, slender, glabrous, 2 ft. ; flowers light purple.
Togo : Misahöhe ; Agomegebirge ; Amedschowe. S. Nigeria : Johann-Albrechsthöhe (Mar.). Fernando Po, 4,000–5,000 ft. (Dec.) ! Also in Spanish Guinea and Congo. Exsicc.—*Mann* 573. *Baumann* 95.
14. **I. kamerunensis** *Warb.* in Engl. Bot. Jahrb. 22 : 51. A robust erect herb, creeping at the base.
Cameroons Mt. : Buea, 3,300 ft. (Jan., Sept.) ! Exsicc.—*Preuss* 590.
15. **I. Preussii** *Warb.* l.c. 50. A slender generally unbranched herb, creeping at the base ; flowers small, rose.
Cameroons Mt. : Buea, 3,300–3,750 ft. (Jan., Sept., Nov.). Also in French Cameroons. Exsicc.—*Preuss* 592. *Deistel* 48.

41. LYTHRACEAE

Herbs, shrubs or trees ; leaves opposite or verticillate, rarely alternate ; stipules absent or very small. Flowers usually actinomorphic, hermaphrodite, solitary to paniculate. Sepals united into a tube, valvate, sometimes with appendages between the lobes. Petals present or absent, inserted towards the top of the calyx-tube, crumpled in the bud. Stamens usually 4 or 8, or rarely more, inserted below the petals ; filaments usually inflexed in bud ; anthers 2-celled, opening lengthwise. Ovary superior, sessile or shortly stipitate, completely or incompletely 2–6-celled (rarely 1-celled) ; style simple, variable in length ; ovules numerous, on an axile placenta sometimes not extending to the top of the ovary. Fruit usually capsular, opening by a transverse slit, by valves, or irregularly. Seeds numerous, without endosperm ; embryo straight.

Mainly in the tropics. Recognised by the opposite exstipulate simple leaves, tubular calyx with valvate lobes, crumpled petals, insertion of the stamens, superior ovary, and numerous seeds without endosperm.

Shrubs or trees often with spiny branchlets ; inflorescence a lax leafy terminal panicle ; flowers 4-merous ; petals much crumpled in bud ; stamens 4 or 8 ; calyx-tube with appendages between the lobes ; fruit subindehiscent . . . . . 1. **Lawsonia**

Herbs or low undershrubs, never spiny ; flowers in small axillary fascicles, cymes or bracteate heads :

Flowers very small in axillary fascicles or small cymes, not crowded into a bracteate head :

Flowers solitary or subsolitary, sessile or subsessile ; fruit a septicidal capsule 2. **Rotala**

Flowers cymose, pedicellate ; fruit a circumcissile capsule .. 3. **Ammannia**
Flowers usually crowded into heads subtended by leafy bracts, if not capitate then fairly large with conspicuous petals ; fruit at length opening by valves ; petals corrugated in bud .. .. 4. **Nesaea**

1. LAWSONIA Linn.—F.T.A. 2 : 482.

A shrub or small tree, the older branchlets often indurated and spinescent ; leaves opposite, elliptic to oblanceolate, acute at each end, up to about 4 cm. long and 2 cm. broad, glabrous, with the midrib impressed above ; panicle many-flowered, with leafy bracts ; flowers 4-merous, creamy-white, sweet-scented ; pedicels about 2 mm. long ; petals crumpled in bud ; stamens 4–8 ; fruit globose, about 0·5 cm. diameter, with persistent style .. .. *inermis*

L. inermis *Linn.*—Koehne in Engl. Pflanzenr. Lythrac. 270, fig. 59. *L. alba* Lam.—F.T.A. 2 : 483 ; Holl. 2 : 322 ; Chev. Bot. 281.
Throughout the area and in N. and E. tropical Africa, Madagascar, tropical Asia and Australia ; cultivated as a dye-plant.

FIG. 57.—AMMANNIA SENEGALENSIS *Lam.* (LYTHRACEAE).
A, leaf. B, flower. C, flower laid open. D, petal. E, stamen from behind. F, cross-section of ovary. G, fruits. H, seed.

2. ROTALA Linn.—F.T.A. 2 : 466.

Leaves mostly in threes, linear, narrow at the base, up to 8 mm. long and about 1 mm. broad ; stamens 2–3 .. .. 1. *mexicana*
Leaves in pairs, oblong to elliptic, broad at the base, over 2 mm. broad :
Calyx with subulate appendages between the lobes ; leaves lanceolate-oblong, rounded at the apex, 0·5–1 cm. long, 2–4 mm. broad ; stamens 2–3 .. 2. *decussata*
Calyx without appendages between the lobes :
Stamens the same number as the sepals ; leaves oblong-elliptic, cordate at the base, rounded at the apex, 0·6–1 cm. long, about 0·5 mm. cm. broad 3. *tenella*
Stamens fewer than the sepals ; leaves ovate-lanceolate, subcordate at the base, 5–7 mm. long, about 3 mm. broad .. .. 4. *elatinoides*

1. **R. mexicana** *Cham. & Schlecht.*—Koehne in Engl. Pflanzenr. Lythrac. 29. *R. verticillaris* Hiern F.T.A. 2 : 467, not of Linn. Annual, prostrate, rooting and branched at the base, 1–4 in. long ; petals absent or early falling off.
N. Nigeria : Nupe ! World-wide in the tropics. Exsicc.—*Barter* 898.

2. **R. decussata** *DC.*—F.T.A. 2 : 467 ; Koehne l.c. 34 ; Chev. Bot. 279. Much-branched annual, 1½ to 9 in. long ; petals 4 or 0 ; in wet places by streams, etc.
Ivory Coast : Nzi Valley (Aug.). Togo : Lome ! N. Nigeria : Lokoja (Nov.) ! Also in Angola. Exsicc. —*Dalz.* 210. *Warnecke* 229.

3. **R. tenella** *Hiern*—F.T.A. 2 : 467 ; Koehne l.c. 39. Stem creeping at the base, with erect branches ; petals 4, white, scarcely longer than the calyx, early falling off.
Senegal : Walo, Richard Tol (Sept., Oct.). French Guinea : Toumanea ! Sierra Leone : Talla Hills. (Feb.) ! Also in Eastern Sudan, Belgian Congo and Transvaal. Exsicc.—*Perrottet. Sc. Elliot* 4852. *Pobéguin* 1897.

4. **Rotala elatinoides** *Hiern*—F.T.A. 2 : 466 ; Koehne l.c. 39 ; Chev. Bot. 279. Annual, creeping, with ascending branches 2–4 in. high ; petals 4, violet or white, rather longer than the calyx.
French Sudan : Nafadié (Jan.) ; Sicoro (Jan.) ; Koulikoro (Oct.). Senegal : several localities (Sept.–Feb.) ! Exsicc.—*Perrottet* 126. *Leprieur*. *Thierry* 214.

3. AMMANNIA Linn.—F.T.A. 2 : 476.

Cymes pedunculate :
Stems thick and spongy, often rooting from the lower nodes, not angular or winged ; leaves obovate-oblanceolate, narrowed to the base, rounded at the apex, 3–4 cm. long, 1·5–2 cm. broad, glabrous ; peduncles up to 1·5 cm. long ; petals present 1. *crassicaulis*
Stems rather slender, wiry, 4-angled or narrowly winged ; leaves lanceolate to linear, auriculate at the base :
Appendages between the calyx-lobes very small or obsolete ; petals 4, caducous or sometimes absent ; capsule bursting transversely about the middle 2. *senegalensis*
Appendages between the calyx-lobes conspicuous ; petals absent ; capsule bursting near the apex .. .. 3. *aspera*
Cymes sessile or subsessile :
Stems and branches more or less quadrangular ; leaves sessile, linear-lanceolate, up to 3·5 cm. long ; petals absent ; pedicels much shorter than the flowers 4. *aegyptiaca*
Stems and branches subterete ; leaves petiolate, lanceolate, up to about 1 cm. long ; petals 4, sometimes absent ; pedicels longer than the flowers .. .. 5. *gracilis*

1. **A. crassicaulis** *Guill. & Perr.*—F.T.A. 2 : 479 ; Chev. Bot. 279. *Nesaea crassicaulis* Koehne in Engl. Pflanzenr. Lythrac. 225. Stem erect or ascending, up to 1 ft. long ; flowers purple-violet ; in marshes and streams.
French Sudan : Bilma (Dec.) ! Senegal : Cape Verde Peninsula ; Cayor (Mar.–May). Mbidjem (Dec.). Also in Zanzibar and Madagascar. Exsicc.—*E. Vogel* (no number).
2. **A. senegalensis** *Lam.*1—F.T.A. 2 : 477 ; Chev. Bot. 280. *A. auriculata* Willd. *A. Prieureana* Guill. & Perr. *A. multiflora* Roxb. and var. *floribunda* Koehne in Engl. Pflanzenr. Lythrac. 48. *A. salsuginosa* Guill. & Perr.—F.T.A. 2 : 477. Erect or procumbent, up to 2 ft. high ; flowers purple-violet ; in muddy ground, rice-fields, etc.
Throughout the area. Extending to Nubia and Abyssinia, to Angola, Central, East and South Africa ; also in Madagascar. Exsicc.—*Perrottet*. *Heudelot* 578. *Thierry* 212 ; 213 ; 216. *Sc. Elliot* 4446. *Chev.* 15771.
3. **A. aspera** *Guill. & Perr.*—F.T.A. 2 : 480. *Nesaea aspera* Koehne l.c. 226. Erect or ascending, branched near the base, 3–6 in. high ; in damp places.
Senegal : near Cape Verde (Mar.) ! Also in Angola. Exsicc.—*Perrottet* 338.
4. **A. aegyptiaca** *Willd.* *A. salicifolia* Hiern—F.T.A. 2 : 478, not of Monti. *A. baccifera* Linn. subsp. *aegyptiaca* Koehne l.c. 55. Erect annual, up to 18 in. or more high, with spreading branches.
N. Nigeria : Yola (Jan.) ! Extends to Egypt, Abyssinia and Nyasaland ; also to Congo and Angola. Exsicc.—*Dalz.* 176.
5. **A. gracilis** *Guill. & Perr.*—Koehne l.c. 52. *A. diffusa* Hiern—F.T.A. 2 : 479, not of Willd. ; Chev. Bot. 280. *A. filiformis* A. Chev. Bot. 280, not of DC. Stem prostrate, rooting at the base, with slender branches, about 1 ft. high ; petals purple-violet to reddish-white.
French Sudan : Nafadié (Jan.) ! Folo (May) ! Senegal : Casamance R. (April) ! French Guinea : Kollangui (Mar.) ! Kouria (Aug.) ! Also in Ubangi-Shari-Chad. Exsicc.—*Perrottet* 335. *Chev.* 154 ; 840 ; 12189 ; 15077.

4. NESAEA Commers.—F.T.A. 2 : 470.

Flowers not congested into bracteate heads ; peduncles 1–3-flowered in the axils of the leaves ; leaves linear or linear-lanceolate, subcordate at the base, acute, up to 5·5 cm. long :
Stamens 12–14 ; peduncles less than 5 mm. long .. .. .. 1. *dodecandra*
Stamens 20–30 ; peduncles 1·2–2 cm. long .. .. 2. *mossiensis*
Flowers numerous and congested into heads subtended by leafy bracts :
Leaves distinctly cordate at the base ; small plant up to 20 cm. high ; flower-heads small, about 5-flowered, subtended by 2 larger bracts ; stems slightly winged ; bracteoles ciliate .. .. 3. *cordata*
Leaves not cordate at the base ; stems up to 4 ft. long :
Bracts subtending the heads 3–4 ; bracteoles glabrous ; flowers many in each head ; stems mostly decumbent and rooting .. .. 4. *radicans*
Bracts subtending the heads 2 ; bracteoles shortly ciliate ; flowers 3–7 in each head ; stems more or less erect .. .. 5. *erecta*

1. **N. dodecandra** *Koehne* in Engl. Pflanzenr. Lythrac. 234. *N. Candollei* Guill. et Perr.—F.T.A. 2 : 473 ; Chev. Bot. 280. Erect, suffrutescent, 1–2 ft. high ; branches 4-angled ; in inundated meadows, etc.
Senegal : Richard Tol (Sept.–Dec.) ! French Guinea : Kollangui (Mar.) ; Diaguissa (April). Exsicc.—*Heudelot*. *Perrottet* 129. *Chev.* 12194 ; 13549.
2. **N. mossiensis** *A. Chev.* in Bull. Soc. Bot. Fr. 58, Mém. 8d : 171 (1911) ; Bot. 280. Undershrub, 2 ft. or more high ; habitat as above.
French Sudan : Mossi Province (July) ! Exsicc.—*Chev.* 24540.
3. **N. cordata** *Hiern*—F.T.A. 2 : 475 ; Koehne l.c. 232 ; Chev. Bot. 280. Erect annual ; branches 4-angled ; flowers pink or red ; in damp spots, wet sand, etc.
Ivory Coast : Toumodi (Aug.) ! N. Nigeria : Borgu ! Lokoja (Oct.) ! Extends to Angola, Eastern Sudan, Central and East Africa. Exsicc.—*Barter* 763. *Dalz.* 194.

1 Koehne, in his monograph of *Lythraceae* in Engler's Pflanzenreich, has recognised several species, which we have included under *A. senegalensis*, mainly determined by the length of the style. This character seems to be so variable in the family and in this particular species that we are unable to distinguish them. *A. senegalensis* is a common and variable weed in moist places.

4. **Nesaea radicans** *Guill. & Perr.* Tent. Fl. Seneg. t. 70.—F.T.A. 2 : 474 ; Koehne l.c. 231 ; Chev. Bot. 280. Stems up to 4 ft. long ; leaves elliptic to oblong-lanceolate, ½–2½ in. long.
Senegal : Cape Verde Peninsula (Oct.–Mar.) ; Niayes (Dec.) ; Mbidjem (Dec.). Gambia ! Also in Angola, East Africa and Madagascar. Exsicc.—*Farmar* 58. *Brown-Lester* 11 ; 32.
5. **N. erecta** *Guill. & Perr.* l.c. t. 69.—F.T.A. 2 : 474 ; Koehne l.c. 231 ; Chev. Bot. 280. Annual, 2–10 in. high ; branches 4-angled ; leaves linear-lanceolate, ½–¾ in. long.
French Sudan : Koulikoro (Oct.). Senegal : Casamance R. ; Cayor (Oct., Nov.) ! Gambia ! Extends to Angola, Abyssinia, Central and East Africa and Rhodesia ; also in Madagascar. Exsicc.—*Heudelot* 563. *Ingram.*

42. ONAGRACEAE

Herbs or rarely shrubs, often aquatic ; leaves opposite or alternate ; stipules mostly absent or deciduous. Flowers hermaphrodite, actinomorphic, often solitary. Calyx-tube adnate to the ovary ; lobes 4–5, valvate. Petals 4–5, free, contorted or imbricate, rarely absent. Stamens as many or twice as many as the calyx-lobes ; anthers 2-celled, opening lengthwise. Ovary inferior or semisuperior, 2–6-celled ; ovules 1 to many, on axile placentas ; style simple.

FIG. 58.—JUSSIAEA VILLOSA *Lam.* (ONAGRACEAE).

A, flower-bud. B, sepals, outer and inner face. C, petal. D, flower. E, anthers, back and front. F, longitudinal section of ovary. G, cross-section of ovary. H, seed.

Fruit a capsule or nut. Seeds numerous or solitary, without endosperm ; embryo straight or nearly so.

Mostly in the Northern Hemisphere. Recognised by the usually inferior ovary, valvate calyx-lobes, definite number of stamens, and seeds without endosperm.

Marsh or terrestrial plants ; fruits capsular, with thin pericarp ; seeds numerous ; flowers yellow ; sepals and petals 4 or 5 :
Stamens double the number of the calyx-lobes .. .. .. 1. **Jussiaea**
Stamens the same number as the calyx-lobes .. .. .. 2. **Ludwigia**
Floating herb ; fruit a woody horned nut ; seed solitary ; flowers white ; sepals, petals and stamens 4 ; ovary semisuperior .. .. 3. **Trapa**

1. JUSSIAEA Linn.—F.T.A. 2 : 488.

Creeping or floating herb rooting at the nodes and frequently with cylindrical hairy float-vesicles ; leaves lanceolate, narrowed into the petiole, subacute at the apex, up to 8 cm. long and 1 cm. broad, lateral nerves inconspicuous ; flowers bright yellow, solitary, axillary ; pedicels about as long as the ovary, with a pair of small bracteoles at the junction .. .. 1. *diffusa*
More or less erect herbs, rarely rooting at the nodes :
Sepals and petals 5 ; stems rather villous in the upper parts ; leaves oblanceolate to obovate, acute at each end, up to 15 cm. long and 2 cm. broad, with numerous fairly conspicuous lateral nerves ; flowers lemon-yellow, solitary, axillary ; pedicels distinct, shorter than the ovary, with no bracteoles ; seeds ellipsoid, smooth 2. *pilosa*

Sepals and petals 4 :

Leaves linear ; stems usually pubescent ; seeds smooth, rounded-oblong ; pedicels short, with two small bracteoles at the apex .. .. **3. *villosa***

Leaves broadly lanceolate or elliptic-lanceolate ; stems glabrous :

Flowers solitary ; seeds free in the capsule ; capsule not verruculose ; pedicels not bracteolate .. .. **4. *linifolia***

Flowers mostly in bunches ; seeds enclosed singly in dehiscent segments of the endocarp ; capsule transversely verruculose ; pedicels with small bracteoles at the apex .. .. **5. *acuminata***

1. **Jussiaea diffusa** *Forsk.*—F.T.A. 2 : 488 ; Chev. Bot. 282.
French Sudan : Ouagadougou (Aug.). Senegal : M'Baouan (Dec.). N. Nigeria : Sokoto (Mar.) ! Katagum (Jan.) ! Bauchi, 2,200 ft. (May) ! Malfoni (July) ! Lagos ! Extends to Abyssinia, and to Angola, Central and East Africa, and Lake Ngami. Exsicc.—*Dalz.* 302 ; 521. *Lely* 172.

2. **J. pilosa** *H. B. & K.*—F.T.A. 2 : 488 ; Chev. Bot. 282. A herb up to 3 ft. high, more or less woody below.
French Sudan : Timbuktu (July) ! Bafaga (April). Senegal ! French Guinea : Kouroussa (Dec.) ! Sierra Leone : Samu (Dec.) ! Kennema (Jan.) ! N. Nigeria : Lokoja ! S. Nigeria : Lagos (June) ! Lagos Colony ! Extends to Eastern Sudan, to Angola, Central and East Africa ; also in tropical America. Exsicc.—*Sc. Elliot* 4368. *Barter* 1554. *Thomas* 7626. *Chev.* 1273 ; 1275. *Pobéguin* 601.

3. **J. villosa** *Lam.* F.T.A. 2 : 489 ; Chev. Bot. 283. Erect, branching, up to 4–5 ft. high ; leaves from 2–13 cm. long, usually without a distinct petiole.
French Sudan : Nafadié (Jan.) ! Bobo-Dioulasso (May). Senegal : Mbidjem ! Casamance (Feb.) ! Gambia ! French Guinea : Kouroussa ! Ditinn (April) ! Liberia : Grand Bassa ! Gold Coast : Accra ! Togo ! N. Nigeria : various localities ! S. Nigeria : Lagos Colony ! Abeokuta ! Cameroons River (Jan.) ! Widely spread in the tropics. Exsicc.—*T. Vogel* 5. *Thierry* 89. *Pobéguin* 446. *Baumann* 246. *Millen* 106. *Irving* 71. *Mann* 2227. *T. W. Brown* 379. *Chev.* 12946. (See Appendix).

4. **J. linifolia** *Vahl*—F.T.A. 2 : 489 ; Chev. Bot. 282. Erect, from a few inches to several feet high ; leaves from 1·5 to 10 cm. long, narrowed to a petiole or to the base ; capsule fairly stout, very shortly stalked.
French Sudan : Timbuktu (July) ! Koulikoro (Oct.) ! Senegal : Walo, Richard Tol, etc. (Sept.–Mar.); Nafadié (Jan.) ; Niayes (Dec.) ; Dakar (Jan.–April). Gambia ! Sierra Leone : Freetown ! Nigeria : common by the R. Niger ! Rio del Rey ! Extends to Eastern Sudan, and to Angola and Nyasaland ; also in tropical America. Exsicc.—*Perrottet.* *Barter* 823. *Farmar* 41. *Brown-Lester* 10. *Chev.* 1276 ; 1277 ; 15773.

5. **J. acuminata** *Sw.*—F.T.A. 2 : 489. *J. altissima* A. Chev. Bot. 282, not of Guill. & Perr. Erect, branched, up to 5 ft. high ; leaves up to 12 cm. long and 2–2·5 cm. broad, sometimes purple-tinged ; capsule narrow, cylindrical, usually distinctly stalked.
French Guinea : Kouria (July) ! Sierra Leone ! Liberia : Kakatown ! N. Nigeria : Sokoto (Dec.) ! Bauchi Plateau, Vom ! Naraguta ! Jos ! Lokoja (Mar.) ! S. Nigeria : Idah (Sept.) ! Lagos ! Lagos Colony ! Cross River ! Extends to Eastern Sudan, and to Angola, St. Thomas Isl., Central and East Africa ; also in tropical America. Exsicc.—*Chev.* 15012. *T. Vogel* 72. *Whyte. Millen* 52; 108; 149.

2. LUDWIGIA Linn.—F.T.A. 2 : 490.

A small prostrate herb rooting at the nodes ; stems very minutely puberulous ; leaves oblong-obovate, narrowed into a short petiole, rounded at the apex, up to 1·2 cm. long and 5 mm. broad, glabrous ; flowers subsessile, axillary, solitary ; sepals broadly ovate, acute ; fruit verrucose, 5–6 mm. long, glabrous ; seeds ellipsoid, smooth, light brown .. .. *pulvinaris*

L. pulvinaris *Gilg* in Baum Kunene-Samb. Exped. 324.
French Sudan : Tiguiberri (Jan.) ! Also known from South Angola and Rhodesia. Exsicc.—*Chev.* 295.

3. TRAPA Linn.—F.T.A. 2 : 491.

A floating herb densely rooting at the lower nodes ; leaves rhomboid-triangular, almost truncate at the base, coarsely dentate, about 3–4 cm. long and broad, strongly pinnately nerved and laxly tomentose below ; petiole of the lower leaves elongated, dilated towards the top, pilose ; flowers solitary, axillary ; pedicels nearly smooth in the lower part, tomentose in the upper ; flowers 4-merous ; fruit when ripe sinking to the bottom, woody, 2-horned .. .. *bispinosa*

T. bispinosa *Roxb.*—F.T.A. 2 : 491 ; Holl. 2 : 324.
N. Nigeria : Yola, in pools (Mar.) ! Also in the Nile and Zambesi districts, and in India. Exsicc. – *Dalz.* 67. (See Appendix).

43. HALORRHAGACEAE

Herbs or undershrubs, often aquatic ; leaves alternate, opposite or verticillate, sometimes very large, the submersed ones often much divided ; stipules absent. Flowers hermaphrodite or unisexual, solitary to paniculate or corymbose, often very small. Calyx-tube adnate to the ovary ; lobes 2–4 or absent. Petals 3 4 or absent, valvate or slightly imbricate. Stamens 2–8, rarely 1, large ; anther basifixed, 2-celled, opening lengthwise. Ovary inferior, 1-4-celled ; styles 1–4 ; ovules as many as the styles, pendulous from the apex of the cells. Fruit small, a nut or drupe, sometimes winged, indehiscent or rarely breaking up into cocci. Seeds pendulous, with copious endosperm and straight fairly large (rarely small) embryo.

A small family, widely spread and usually found in damp or boggy places. **Only two species represented in our area.**

LAUREMBERGIA Berg.—F.T.A. 2 : 405, as *Serpicula* Linn.

Flowers axillary, glomerate, unisexual, minute. Calyx-tube 8-nerved; lobes 4. Petals 4 or absent from the female flowers. Ovary-cells and styles 4 or the latter absent; stigmas plumose.

Stems puberulous or glabrous; flowers minute, up to about 11 in each leaf-axil; leaves alternate, linear or linear-oblanceolate, slightly toothed, 1–1·3 cm. long, glabrous or nearly so .. .. 1. *Engleri*

Stems and other parts white-villous all over; flowers up to 7 in each leaf-axil; leaves opposite, oblong or obovate, serrate to 3-lobulate, about 1 cm. long 2. *villosa*

1. **L. Engleri** *Schindler* in Engl. Pflanzenr. Halorrh. : 73, fig. 21. Creeping in marshy ground. N. Nigeria: Nupe l Exsicc.—*Barter* 1665.

2. **L. villosa** *Schindler* l.c. A minute undershrub in damp ground. Senegambia: Mboro. Exsicc.—*Perrottet* 742. *Leprieur.*

44. THYMELAEACEAE

Trees, shrubs or rarely herbs; leaves opposite or alternate, entire, often small and ericoid; stipules absent. Flowers actinomorphic, usually hermaphrodite, sometimes capitulate. Calyx tubular, more or less cylindric, sometimes long and slender; lobes 4–5, imbricate. Petals present or absent, sometimes very small, mostly inserted at the mouth of the calyx-tube. Stamens as many or twice as many as the calyx-lobes, inserted in the calyx-tube; anthers 2-celled, opening lengthwise. Disk hypogynous or absent. Ovary superior, 1–2-celled; ovule solitary in each cell, pendulous; style simple; stigma entire. Fruit a nut, drupe or pyrene, usually enclosed in the base of the calyx-tube. Seeds with or without endosperm; embryo straight.

Mainly South African, Mediterranean and Australian. Recognised by the woody habit, absence of stipules, actinomorphic tubular often coloured calyx, and reduced or absent petals.

Petals large and conspicuous, mostly as long as the calyx-lobes and often deeply divided; leaves very oblique, acuminate; flowers solitary or paired in the leaf-axils 1. **Dicranolepis**

Petals absent or very small and scale-like:
Flowers not capitate, in axillary clusters, umbels or racemes:
Petals present, scale-like, in pairs opposite the sepals; calyx divided nearly to the base .. .. 2. **Octolepis**
Petals present, fused into a ring at the mouth of the calyx-tube 3. **Synaptolepis**
Petals absent; calyx tubular:
Inflorescence pedunculate; ovary 2-celled; calyx-tube rather broad and cylindric, with very short, broad lobes .. .. 4. **Peddiea**
Inflorescence not pedunculate; ovary 1-celled; calyx-tube long and slender, with linear lobes .. .. 5. **Craterosiphon**
Flowers capitate, surrounded by an involucre of bracts:
Calyx-lobes 4:
Petals present, sometimes very small; stamens slightly exserted from the calyx-tube 6. **Gnidia**
Petals absent; stamens included in the calyx-tube .. .. 7. **Arthrosolen**
Calyx-lobes 5; petals present or absent; stamens shortly exserted from the calyx-tube .. .. 8. **Lasiosiphon**

1. DICRANOLEPIS Planch.—F.T.A. 6, 1 : 238.

Calyx glabrous or nearly so:
Stigma discoid or capitate; petals about half as long as the calyx-tube:
Flowers about 2·5 cm. long; calyx-tube very slender; segments of petals slightly incised near the apex .. .. 1. *stenosiphon*
Flowers less than 2 cm. long; calyx-tube short; segments of the petals entire, acute 2. *Buchholzii*
Stigma club-shaped:
Flowers solitary; leaves rather gradually acuminate, up to 8 cm. long and 3 cm. broad, mostly greenish below when dry; calyx-tube about 2·5 cm. long 3. *disticha*
Flowers in pairs; leaves rather abruptly acuminate, up to 10 cm. long and 4 cm. broad, brownish below when dry; calyx-tube about 2·5 cm. long 4. *Mannii*

Calyx densely appressed-tomentose or with spreading hairs :
Stigma discoid or capitate :
Bracteoles subulate-linear ; anthers well exserted ; petals as long as or longer than the calyx-lobes ; limb of the calyx in bud about 1·5 cm. long, indumentum of the tube somewhat appressed .. .. 5. *grandiflora*
Bracteoles ovate or ovate-lanceolate ; anthers only just exserted, petals hardly as long as the calyx-lobes ; limb of calyx in bud stout, about 1 cm. long, indumentum spreading-tomentose .. .. 6. *vestita*
Stigma club-shaped :
Leaves fairly large, about 8–10 cm. long and 2–4 cm. broad ; petals divided to the base, longer than the calyx-lobes ; limb of calyx ellipsoid in bud, about 1 cm. long, striate .. .. 7. *Persei*
Leaves smaller, up to 6 cm. long and 2·5 cm. broad :
Segments of the petals entire ; leaves very obliquely lanceolate ; calyx-tube very slender, about 2·5 cm. long .. .. 8. *polygaloides*
Segments of the petals more or less toothed ; leaves obliquely ovate :
Calyx-tube about 2·5 cm. long, glabrous inside .. .. .. 9. *laciniata*
Calyx-tube about 2 cm. long, pubescent inside .. .. .. 10. *pubescens*

FIG. 59.—DICRANOLEPIS DISTICHA *Planch.* (THYMELAEACEAE).
A, flower. B, stamen. C, ovary with style. D, ovary and tubular disk in vertical section. E, fruit.

1. **Dicranolepis stenosiphon** *H. H. W. Pearson*—F.T.A. 6, 1 : 240. A shrub with slender branches, sparsely pilose.
S. Nigeria : Oban ! Also in Cameroons. Exsicc.—*Talb.* 2312.
2. **D. Buchholzii** *Engl. & Gilg*—F.T.A. 6, 1 : 241. A low bush with slender branches, sparsely pubescent, later glabrous.
S. Nigeria : Johann-Albrechtshöhe ! R. Mungo. Exsicc.—*Staudt* 803.
3. **D. disticha** *Planch.*—F.T.A. 6, 1 : 243 ; Chev. Bot. 545. A shrub, 4 ft. high, with slender glabrous branches.
French Guinea : Timbo (Mar.) ; Diaguissa (April). Kaba Valley (May). Sierra Leone : Samu (Dec.) ! Scarcies R. (Jan.) ! Ivory Coast : Guidéko (May). S. Nigeria : Owhy (Dec.) ! Cameroons River (Jan.) ! Also in Gabon. Exsicc.— *Afzelius. Sc. Elliot* 4205 ; 4703. *Mann* 2199. *Holl.* 179.
4. **D. Mannii** *Baill.*—F.T.A. 6, 1 : 242. A shrub 8–10 ft. high, with slender pubescent or glabrous branches.
Fernando Po (Jan.) ! Exsicc.—*Mann* 217.
5. **D. grandiflora** *Engl.*—F.T.A. 6, 1 : 240. *D. Talbotiorum* S. Moore. A shrub up to 15 ft. high, with pubescent, later glabrescent branches.
Gold Coast : Okroase (Dec.) ! S. Nigeria : Lagos Colony ! Ogba R. (Dec.) ! Degema ! Oban ! Johann-Albrechtshöhe ! Fernando Po ! Exsicc.—*Talb.* 1273 ; 1280 ; 3693. *Mann* 23. *Staudt* 473.
6. **D. vestita** *Engl.*—F.T.A. 6, 1 : 241. A shrub 8–10 ft. high with slender pubescent, later glabrous branches.
Cameroons Mt., 2,000–4,000 ft. (Dec., Feb.) ! Buea ! Fernando Po ! Exsicc.—*Mann* 1214 ; 1261. *Deistel* 278.
7. **D. Persei** *Cummins*—F.T.A. 6, 1 : 242 ; Chev. Bot. 545. A shrub 4–8 ft. high, like the last ; fruit red when ripe.
Ivory Coast : several localities ! Gold Coast : Kumasi ! Juaso (Dec.) ! Akim (Feb.) ! Exsicc.—*Cummins* 186. *Dalz.* 111. (See Appendix).
8. **D. polygaloides** *Gilg*—F.T.A. 6, 1 : 243. A shrub ; young branches densely pubescent, later glabrous.
Cameroons : R. Mungo ! Exsicc.—*Schlechter* 12889.
9. **D. laciniata** *Gilg*—F.T.A. 6, 1 : 243. A much-branched shrub about 6 ft. high, with spreading pubescent, later glabrous branches ; in moist shady woods.
Togo : Misahöhe ! Exsicc.—*Baumann* 481.
10. **D. pubescens** *H. H. W. Pearson*—F.T.A. 6, 1 : 243. A shrub, with young branches densely pubescent, later glabrous.
French Guinea: Kassa, near the Sierra Leone boundary. Exsicc.—*Sc. Elliot* 5066.

2. OCTOLEPIS Oliv.—F.T.A. 6, 1 : 252.

Sepals 5 ; leaves rather narrowly oblong-elliptic, more or less gradually triangular-acuminate, very shortly cuneate at the base ; lateral nerves about 6–7 pairs, prominently looped .. .. 1. *decalepis*

Sepals 4 ; leaves rather broadly obovate or obovate-elliptic, rather abruptly caudate-acuminate, gradually narrowed from above the middle to the base ; lateral nerves 8–14 pairs .. .. 2. *Casearia*

1. **O. decalepis** *Gilg*—F.T.A. 6, 1 : 253. A low shrub, with glabrous grey-brown branches.
Liberia : Grand Bassa (Sept.–Oct.) ! Exsicc.—*Dinklage* 2044.
2. **O. Casearia** *Oliv.*—F.T.A. 6, 1 : 254. *O. Dinklagei* Gilg. *O. macrophylla* Gilg. A shrub, 6–8 ft. high ; branchlets pubescent when young.
S. Nigeria : Calabar (Feb.) ! Johann-Albrechtshöhe ! Also in French Cameroons and Spanish Guinea. Exsicc.—*Mann* 2306. *Staudt* 838.

3. SYNAPTOLEPIS Oliv.—F.T.A. 6, 1 : 245.

A low glabrous shrub ; branches sparingly leafy, purplish ; leaves elliptic-obovate, shortly cuneate at the base, often widely retuse at the apex, up to 6 cm. long and 2·5 cm. broad, with a thick recurved margin, tawny below, with numerous raised

FIG. 60.—OCTOLEPIS DECALEPIS *Gilg* (THYMELAEACEAE).
A, open flower showing the scale-like petals. B, longitudinal section of same. C, stamen. D, pistil. E, cross-section of ovary. F, fruits.

lateral nerves ; flowers not seen ; fruit enclosed in the persistent ovoid calyx-tube about 1·5 cm. long and capped by the slender upper style-like portion of the calyx-tube and lobes .. .. *retusa*

8. retusa *H. H. W. Pearson.*—F.T.A. 6, 1 : 247.
French Guinea : ? locality ! Exsicc.—*Farmar. Poéguin* 2109.
Chevalier has in his herbarium a barren specimen, No. 338 from Dougoura, French Guinea, which he has enumerated (Chev. Bot. 546) as *S. retusa*. It bears the manuscript name *S. djalonensis* A. Chev., and is apparently not quite the same species, but is too imperfect for description. The leaves are more elliptic-oblong, not or only slightly retuse, and the margin and nerves much less prominent than in *S. retusa*.

4. PEDDIEA Harv.—F.T.A. 6, 1 : 248.

Flowers 1·5 cm. long ; peduncle about 3·5 cm. long ; pedicels about as long as the flowers ; leaves oblanceolate, rather obtusely acuminate, 10–15 cm. long, lateral nerves rather ascending .. .. 1. *longiflora*

Flowers less than 1 cm. long ; peduncle about 1 cm. long ; pedicels longer than the flowers ; leaves lanceolate-elliptic, acute at each end, 5–9 cm. long, lateral nerves spreading .. .. 2. *parviflora*

1. **P. longiflora** *Engl. & Gilg*—F.T.A. 6, 1 : 249. *P. parviflora* A. Chev. Bot. 546, not of Hook. f. A shrub, in wet thickets.
French Guinea : Futa Jallon (Mar.) ! Dalaba-Diaguissa Plateau, 3,000–3,900 ft. (Oct.) ! Togo : Assuma ! Bismarcksburg : Konkoa. Also in Uganda. Exsicc.—*Büttner* 287. *Chev.* 18041 ; 18791.
2. **P. parviflora** *Hook. f.*—F.T.A. 6, 1 : 251. A tree, 15–20 ft. high ; flowers greenish-white.
Fernando Po, 5,000 ft. (Nov.) ! Exsicc.—*Mann* 567.

FIG. 61.—LASIOSIPHON KRAUSSIANUS *Meisn.* (THYMELAEACEAE).

A, flower-bud. B, calyx-lobe. C, petal. D, flower. E, flower in longitudinal section. F, anthers. G, ovary with style

5. CRATEROSIPHON Engl. & Gilg—F.T.A. 6, 1 : 248.

A glabrous climbing shrub ; leaves often subopposite, oblong-elliptic, shortly cuneate at the base, obtusely acuminate, 6–9 cm. long, 2·5–4 cm. broad, with numerous lateral nerves spreading almost at right angles ; petiole 5–6 mm. long ; flowers greenish-yellow, 3–6 in the leaf-axils, subsessile ; stamens included in the calyx-tube *scandens*

C. scandens *Engl. & Gilg*—F.T.A. 6, 1 : 248. *C. djalonensis* A. Chev. Bot. 546, name only (?).
French Guinea : Futa Jallon ! S. Nigeria : Calabar ! Cameroons Mt. : Buea, 3,900 ft. ! Also in French Cameroons. Exsicc.—*Thomson* 75. *Preuss* 878. *Chev.* 13363 bis ; 18677 ; 18731 ; 20183.

6. GNIDIA Linn.—F.T.A. 6, 1 : 216.

Calyx glabrous in the upper part ; stems short and unbranched from an erect woody rhizome ; leaves oblanceolate, obtuse, up to 2·5 cm. long and 8 mm. broad
1. *mittuorum*

Calyx pubescent in the upper part ; stems elongated, branched ; leaves narrowly lanceolate, acute, about 1·2 cm. long .. .. 2. *Schweinfurthii*

1. **G. mittuorum** *Gilg*—F.T.A. 6, 1 : 218 ; Chev. Bot. 545. Glaucous and often purplish-tinged ; flowering stems appearing after the bush-fires.
French Sudan : Couroula (April). N. Nigeria : Zaria Province (Feb.) ! Bauchi Plateau ! Extends to Eastern Sudan and Kenya. Exsicc.—*Dalz.* 387. *Dent Young* 221.

2. **G. Schweinfurthii** *Gilg*—F.T.A. 6, 1 : 219. Flowering period as above.
N. Nigeria : Zaria Province (Feb.) ! Bauchi Plateau ! Extends to Eastern Sudan. Exsicc.—*Dalz* 406. *Lely* 76.

7. ARTHROSOLEN C. A. Mey.—F.T.A. 6, 1 : 234.

Involucral bracts ovate, acutely acuminate, shorter than the flowers ; leaves linear-acicular, with hard acute tips, 1·5–2 cm. long ; heads with numerous flowers ; calyx shortly pubescent .. .. 1. *chrysanthus*

Involucral bracts obovate, rounded at the apex, as long as or longer than the flowers ; leaves linear, obtuse, up to 2·5 cm. long ; heads with few (about 12) flowers ; calyx more or less villous .. .. 2. *foliosus*

1. **A. chrysanthus** *Solms-Laub.*—F.T.A. 6, 1 : 234. Stems up to 2 ft. high, from a woody rootstock ; in damp places amongst grass.
French Guinea : Kebeya (June) ! N. Nigeria : Sokoto Province ! Kontagora (Nov.) ! Katagum ! Naraguta ! Zungeru ! Lokoja ! Extends to Eastern Sudan, Central and East Africa. Exsicc.—*Baikie. Dalz.* 106 ; 427. *Lely* 79.

2. **A. foliosus** *H. H. W. Pearson*—F.T.A. 6, 1 : 237 ; Chev. Bot. 544. Flowering stems stout, woody, up to 2 or 3 ft. high ; flowers golden-yellow.
French Sudan : near Bamako (Jan.) ! Exsicc.—*Chev.* 256.

8. LASIOSIPHON Fres.—F.T.A. 6, 1 : 227.

A tree, up to 30 ft. high, much branched ; older branchlets marked by the scars of the fallen leaves ; leaves oblanceolate, very acute, 5–8 cm. long, the margin recurved at the base, glabrous ; flower-heads subsessile, large, about 5 cm. in diameter, surrounded by large ovate glabrescent to softly tomentellous bracts ; calyx-tube tomentose and with a dense tuft of long silky golden hairs at the base ; petals spathulate
1. *glaucus*

Stems dwarf, more or less simple and arising from woody rhizomes, glabrous or pubescent ; leaves lanceolate, obtuse or subacute, 3–4 cm. long, glabrous or pubescent ; flower-heads on long peduncles, about 3 cm. in diameter, with lanceolate pubescent or glabrous bracts ; calyx-tube silky-pilose, with longer whitish hairs towards the base ; petals membranous, often emarginate or lobed .. .. .. 2. *Kraussianus*

1. **L. glaucus** *Fres.*—F.T.A. 6, 1 : 230.
Cameroons Mt., 7,000–7,500 ft. (Dec., Jan.) ! Buea ! Also in Cameroons, and the mountainous regions of Abyssinia, Central and East Africa. Exsicc.—*Mann* 1201 ; 2171.

2. **L. Kraussianus** *Meisn.*, as *L. Kraussii*—F.T.A. 6, 1 : 231 ; Holl. 4 : 571 ; Chev. Bot. 545, as *Gnidia Kraussiana* Meisn. *L. guineensis* A. Chev. Bot. 545. *L. Kerstingii* H. H. W. Pearson—F.T.A. 6, 1 : 233. Flowering stems appearing after the bush-fires.
French Sudan : Tabacco (Jan.). French Guinea : Labé (April) ! N. Nigeria : many localities (Jan.–Mar.) ! Extends to Eastern Sudan and south to Rhodesia and S. Africa. Exsicc.—*Barter* 781 ; 1668. *Talb.* 668. *Chev.* 121 ; 12282 ; 12327. (See Appendix).

45. NYCTAGINACEAE

Herbs, shrubs or trees. Leaves alternate or opposite, simple ; stipules absent. Flowers actinomorphic, hermaphrodite or unisexual, usually cymose, sometimes surrounded by brightly coloured bracts, the latter occasionally simulating a calyx. Calyx tubular, often petaloid, valvate or folded in the bud. Petals absent. Stamens 1 to many, hypogynous, free or connate at the base, involute in bud ; anthers 2-celled, opening lengthwise. Ovary superior, 1-celled ; style slender ; ovule solitary, erect and inverted. Fruit indehiscent,

enclosed in the persistent base of the calyx, often glandular. Seeds with copious or scanty endosperm and straight or curved embryo.

Mainly in tropical America, a few in the tropics and subtropics of the Old World. Recognised by the absence of stipules, regular apetalous flowers with tubular perianth, superior 1-celled ovary and indehiscent often glandular fruit.

Bracts small and free, not resembling a calyx :
A spiny shrub ; flowers polygamo-dioecious ; fruits on long pedicels, clothed with rows of numerous sticky gland-tipped tubercles .. .. .. **1. Pisonia**
Not spiny ; herbaceous ; flowers hermaphrodite ; fruit with small glands or tubercles **2. Boerhaavia**
Bracts connate and forming a calyx-like involucre ; flowers hermaphrodite ; fruits not glandular.. .. .. **3. Mirabilis**

1. PISONIA Linn.—F.T.A. 6, 1 : 8.

Climbing shrub, armed with stout sharp axillary curved spines ; leaves broadly elliptic, subacute at the base, obtuse at the apex, 6–9 cm. long, 3–5 cm. broad, finely tomentel-

Fig. 62.—Boerhaavia diffusa *Linn.* (Nyctaginaceae).

A, flower-cluster. B, single flower. C, anther. D, anther from behind. E, calyx in vertical section. F, embryo. G, fruit. H, fruit in transverse section.

lous below when young, at length glabrous ; flowers unisexual, cymose ; calyx tomentellous ; stamens exserted ; fruits on long pedicels, clothed with rows of numerous hard sticky gland-tipped tubercles, tomentellous between the rows *aculeata*

P. aculeata *Linn.*—F.T.A. 6, 1 : 8 ; Holl. 4 : 539.
Probably introduced, but now general in the tropics.

2. BOERHAAVIA Vaill.—F.T.A. 6, 1 : 2.

Fruits with distinct longitudinal ribs, very finely glandular but with no warty glands :
Ascending, with fairly large long-petiolate ovate leaves glabrous or nearly so ; flowers in small clusters arranged in lax terminal panicles .. .. .. **1.** ***diffusa***
Ascending, with leaves as above but rather thick and like the stems densely viscous-pubescent ; flowers in rather dense corymbose cymes .. .. .. **2.** ***viscosa***
More or less prostrate or spreading, with small shortly petiolate lanceolate leaves ; flowers few, on very slender short mostly axillary peduncles .. .. **3.** ***repens***
Fruits provided with large wart-like subsessile or stalked glands, especially towards the apex :
Calyx widely funnel-shaped from above the ovary and about 2 mm. long ; stamens 2, slightly exserted .. .. **4.** ***verticillata***
Calyx narrowly tubular above the ovary, funnel-shaped in the upper half and about 1 cm. long ; stamens 4, long-exserted .. .. **5.** ***plumbaginea***

1. **Boerhaavia diffusa** *Linn.* Sp. Pl. 3. *B. repens* Linn. var. *diffusa* Hook. f.—F.T.A. 6, 1 : 5 ; Holl. 4 : 538. *B. adscendens* Willd.—F.T.A. 6, 1 : 4 ; Holl. 4: 537 ; Chev. Bot. 525.
A common herbaceous weed of waste places throughout the area, and in the tropics of the Old World generally. (See Appendix).
2. **B. viscosa** *Lag. & Rodr.* in Anal. Cienc. Nat. 4 : 256 (1801). *B. repens* Linn. var. *viscosa* Choisy—F.T.A. 6, 1 : 5 ; Chev. Bot. 526. Habit like the last.
Mauritania : Nouaguelmich (Sept.). N. Nigeria : Sokoto (Aug., Nov., Dec.) ! Also in East Africa and Arabia, and in tropical South America. Exsicc.—*Dalz.* 386. *Chev.* 28742.
3. **B. repens** *Linn.*—F.T.A. 6, 1 : 4, excl. vars. ; Holl. 4 : 538 ; Chev. Bot. 526.
French Sudan : Timbuktu (July). N. Nigeria : Katagum (Oct.) ! R. Benue ! Also in the Cape Verde Islands, N.E. tropical Africa, Angola and tropical Asia. Exsicc.—*Leprieur. Dalz.* 148. *Talb.* 48a.
4. **B. verticillata** *Poir.*—F.T.A. 6, 1 : 6 ; Chev. Bot. 526. Stems tall, much-branched, diffuse, glabrous.
Mauritania : Tijirit. French Sudan : Timbuktu (July). Senegal : Cape Verde, etc. (Oct.–Jan.) ! Also in Angola, N.E. tropical Africa, Arabia and tropical Asia. Exsicc.—*Roger* 81.
5. **B. plumbaginea** *Cav.*—F.T.A. 6, 1 : 6 ; Holl. 4 : 538 ; Chev. Bot. 526. Stems tall, erect or scrambling.
Senegal : Cayor (Feb.) ! Mbidjem (Aug.) ! Niayes (Dec.). N. Nigeria : Katagum (Oct.) ! Generally distributed in tropical Africa, extending to N. Africa and Arabia. Exsicc.—*Thierry* 71. *Dollinger* 44. *Dalz.* 196. (See Appendix).

3. MIRABILIS Linn.—F.T.A. 6, 1 : 1.

Erect herb ; leaves ovate-triangular, acutely acuminate, more or less truncate at the base, up to 10 cm. long and 6 cm. broad, conspicuously marked with cystoliths ; petiole rather long and slender ; flowers cymose, few ; bracts calyx-like, connate in the lower part, puberulous ; calyx petaloid, long-tubular with an expanded 5-lobed limb, tube 4 cm. long, glabrescent ; fruit about as long as the involucre, black when dry, ribbed, glabrous .. .. *Jalapa*

M. Jalapa *Linn.*—F.T.A. 6, 1 : 2 ; Holl. 4 : 537.
Native of Peru and now established in many parts. (See Appendix).

46. PROTEACEAE

Trees or shrubs. Leaves alternate, rarely opposite, simple or much divided ; stipules absent. Flowers (in our species) in a bracteate capitulum or elongated spike. Calyx petaloid, tetramerous, valvate, tubular in bud, one segment soon splitting away from the others and releasing the style, three segments remaining united. Stamens 4 ; anthers opposite the calyx-lobes, subsessile, 2-celled, opening lengthwise. Hypogynous scales often present. Ovary superior, 1-celled ; style long, simple ; ovule 1 (in our species), subpendulous. Fruit a nut, densely bearded, crowned by the persistent style. Seed without endosperm.

Mainly confined to South Africa and Australia. A distinct family with the flowers in our species in large bracteate heads or elongated spikes.

Flowers in an elongated spike without an involucre .. .. 1. **Faurea**
Flowers in a head surrounded by numerous bracts .. .. 2. **Protea**

1. FAUREA Harv.—F.T.A. 6, 1 : 207.

Tree, with catkin-like spikes of flowers ; leaves lanceolate, acute at each end, mucronate, 12–14 cm. long, 2·5–3·5 cm. broad, with numerous not very prominent lateral nerves looped near the margin ; petiole nearly 1 cm. long ; flowers about 1·5 cm. long ; calyx petaloid, ribbed, pubescent .. .. 1. *saligna*

Tree, medium-sized, with flowers as above ; leaves broadly elliptic-lanceolate, acute at each end, obtusely mucronate, 12–16 cm. long, 4–7 cm. broad, with numerous very prominent lateral nerves below branched or looped near the margin ; petiole 1–2 cm. long ; flowers 1·5 cm. long, curved before opening ; calyx petaloid, softly tomentose .. .. 2. *speciosa*

1. **F. saligna** *Harv.*—F.T.A. 6, 1 : 209 ; Holl. 4 : 569. *F. speciosa* Volkens, not of Welw. A tree of savannah-forests ; very rare.
Togo : Fupaberg in Sokode-Basari. N. Nigeria : near Zaria (Feb.) ! Also in Nile Land to S. Africa and Angola. Exsicc.—*Dalz.* 393. (See Appendix).
2. **F. speciosa** *Welw.*—F.T.A. 6, 1 : 211. A tree, 20 ft. high, not common ; flowers reddish.
N. Nigeria : Naraguta ! Also in East Africa, Angola and S. Africa. Exsicc.—*Lely* 730. (See Appendix).

2. PROTEA Linn.—F.T.A. 6, 1 : 194.

Branchlets and leaves softly tomentose ; leaves elliptic, oblong-elliptic to elliptic-lanceolate, shortly cuneate at the base, obtuse at the apex, 12–20 cm. long, 5–10 cm. broad ; lateral nerves numerous, equally prominent on both surfaces ; capitulum very broadly ovoid, about 10 cm. in diam. ; bracts about 10-seriate, the outermost quite small and glabrescent, the innermost spathulate, about 5 cm. long, clothed outside with silky appressed hairs ; calyx-limb about 1·5 cm. long, silky-pilose outside, the tube shaggy-plumose .. .. 1. *Elliottii*

Branchlets and leaves glabrous ; leaves ovate-lanceolate or lanceolate :

Leaves ovate-lanceolate, cuneate at the base, obtuse, up to 15 cm. long and 5 cm. broad, with numerous forked lateral nerves ; capitulum as in preceding species, but calyx-limb nearly 2·5 cm. long and very shaggy-villous, the tube thinly pilose or glabrescent .. .. 2. *angolensis*

Leaves obliquely lanceolate, cuneate at the base, subacute, 7–15 cm. long, 1·5–4 cm. broad, laxly reticulate on both surfaces, with a distinct intramarginal nerve ; capitulum subcampanulate, about 6 cm. long and 5 cm. in diam., with fewer series of bracts than above, the innermost glabrescent in the upper part ; calyx-limb 1·3 cm. long, the middle lobe glabrous, the tube thinly pilose .. 3. *argyrophaea*

1. **Protea Elliottii** *C. H. Wright*—F.T.A. 6, 1 : 205 ; Chev. Bot. 544. *P. Bismarckii* Engl., name only. A shrub, up to about 10 ft. ; leaf-blades often disposed vertically ; flowers white, strongly odorous ; chiefly in the savannah regions.
French Guinea : Banancoro (Feb.) ! Gobiré to Ditinn (Mar.) ! Gold Coast : Bole, N.T. (April) ! Jemma. Ashanti (July) ! Togo : Sokode (April) ! Bo Gebirge ! N. Nigeria : Zungeru (Sept.) ! Kontagora (Jan.)! S. Nigeria : Eruwa ! Exsicc.—*Elliott* 9. *Kersting* 82 ; A638. (See Appendix).

2. **P. angolensis** *Welw.*—F.T.A. 6, 1 : 205. *P. abyssinica* A. Chev. Bot. 544, not of Willd. Like the preceding.
French Guinea : Dalaba Plateau (Dec.) ! Ivory Coast : Toura country, 900–2,700 ft. on mountains (May) ! Gold Coast : Daka River (May) ! Zau (Aug.) ! Extends to Angola, S.W. Africa, East Africa and Rhodesia. Exsicc.—*Dalz.* 175. *Chev.* 20273 ; 21670.

3. **P. argyrophaea** *Hutch.* in Kew Bull. 1922 : 398. A shrub, about 4 ft.
N. Nigeria : Bauchi Plateau, between Hepham and Ropp, 4,600 ft. (July) ! Exsicc.—*Lely* 381.

FIG. 63.—PROTEA ELLIOTTII *C. H. Wright* (PROTEACEAE).

A, flower showing calyx and style. B, upper lip of calyx, composed of 3 united segments. C, stamens on the calyx-limb (upper lip). D, stamen on calyx-limb (lower lip). E, stamen. F, ovary clothed with long hairs, and style. G, the same in longitudinal section. H, portion of receptacle with tufts of hairs.

47. DILLENIACEAE

By T. F. CHIPP

Shrubs or undershrubs, often climbing, rarely trees or herbs ; leaves alternate, simple, entire or dentate (rarely divided) ; stipules very rare, and then adnate to the petiole and early deciduous. Inflorescence various. Flowers yellow or white, hermaphrodite or polygamous, rarely dioecious. Sepals 5, rarely fewer, imbricate, persistent. Petals 5 or fewer, imbricate, fugacious. Stamens hypogynous, numerous, rarely 10 or fewer, free or variously united at the base. Carpels 1 or many, generally free ; ovules 1 to many in each carpel. Fruits dehiscing by one or both sutures. Seeds 1 or few, with an aril ; endosperm copious, with minute embryo.

Tropics generally and in Australia. Recognised by the alternate strongly penninerved exstipulate simple leaves, persistent imbricate sepals, usually numerous stamens, divergent anther-cells, mostly free and few carpels, and arillate seeds.

TETRACERA Linn.—F.T.A. 1 : 12.

Climbing shrubs, rarely trees. Leaves simple, entire or denticulate. Panicles terminal, spreading, rarely few-flowered. Flowers yellow, white, or calyx green. Sepals spreading. Filaments dilated above; anthers 2-celled. Carpels 3–5 (rarely 1–2), acuminate, coriaceous when mature, shining; ovules indefinite in two series. Seeds 1–5; aril laciniate, scarlet.

Perianth glabrous outside or with few silky appressed hairs, sericeous inside; leaves ovate to obovate, scabrid above, often loosely pilose beneath :
Carpels sericeous when young, mature finely striate, glabrous or with a few hairs at the apex .. .. 1. *potatoria*
Carpels glabrous when young, or with a few hairs at the apex, mature not striate, glabrous .. .. 2. *leiocarpa*
Perianth glabrous or nearly so both outside and inside; leaves oblong, lanceolate to ovate, glabrous above, pilose or strigose beneath :
Leaves rounded at the apex, slightly apiculate or emarginate, glabrous or with appressed hairs on the nerves below; petals 0·7 cm. long or more, 0·5–0·7 cm. broad :
Carpels glabrous; calyx glabrous or hairy outside; rhachis glabrous or strigose; pedicels usually tomentose; tertiary nerves very numerous and parallel 3. *alnifolia*

FIG. 64.—TETRACERA ALNIFOLIA *Willd.* (DILLENIACEAE).

A, flower from below. B, flower in vertical section. C, petal. D, stamens, front and back. E, vertical section of carpel. F, carpels. G, seed with aril.

Carpels densely sericeous when young, strigose when mature; tertiary nerves rather few and more or less reticulate .. .. 4. *Dinklagei*
Leaves acute or abruptly acuminate at the apex; carpels glabrous :
Leaves broadly elliptic, abruptly acute, mostly rounded at the base, with the lateral nerves below and the often winged petiole clothed with long slender hairs; petals about 0·4 cm. long and 0·3 cm. broad; petiole 2 cm. long .. 5. *podotricha*
Leaves oblong-lanceolate, mostly gradually acute at both ends, glabrous; petiole about 1 cm. long .. .. 6. *djalonica*
Perianth sericeous on both sides; leaves obovate to elliptic; carpels sericeous when young :
Leaves hairy beneath along the nerves; petioles not winged, 1–2 cm. long 7. *affinis*
Leaves usually hairy beneath; petioles winged .. .. 8. *eriantha*

1. **T. potatoria** *Afz.*—Stapf 573; Holl. 1 : 47. *T. obtusata* Planch.—F.T.A. 1 : 12; Chev. Bot. 5. *T. alnifolia* Pobéguin Essai Fl. Guin. Fr. 195, t. 42 (1906), not of Willd. A twining shrub, bush or small tree, with yellowish-white scented flowers. Common in the forest.
Senegal: Casamance, etc. (Feb.)! French Guinea: several localities (Oct.–Feb.)! Sierra Leone: several localities (Oct.–April)! Liberia: Fishtown. Ivory Coast: Upper Cavally (April). Togo: Lome! S. Nigeria: Lagos (Nov.)! Abeokuta! Awka! Otto! Oban! Also in the Eastern Sudan and Uganda. Exsicc.—*Heudelot* 643. *Don. Debeaux* 329. *Sc. Elliot* 3836. *Irving. Talb.* 1320. *Chev.* 14873. *Warnecke* 448. (See Appendix).
2. **T. leiocarpa** *Stapf* 574—Chev. Bot. 5. Habit of the preceding.
Liberia: Kakatown! Ivory Coast: Cavally Basin (Aug.); Tabou (Aug.). Exsicc.—*Whyte.*

8. **Tetracera alnifolia** *Willd.*—F.T.A. 1 : 12, including var. ; Holl. 1 : 47 ; Chev. Bot. 4, including var. *intermedia* A. Chev. ; Guill. & Perr. Tent. Fl. Seneg. t. 1, as *T. rugosa* Guill. & Perr. *T. senegalensis* DC. *T. senegalensis* DC. var. *gambica* Williams. A twining shrub, 10–15 ft. high, with white fragrant flowers ; common ; reported from the forest area and also as growing on maritime dunes.
French Sudan and Senegal to S. Nigeria and Fernando Po. Also in Princes Isl. Exsicc.—*Heudelot. T. Vogel* 4. *Barter* 66 ; 2099. *Mann* 463. *Sc. Elliot* 5136. *Whyte. Debeaux* 349. *Kalbreyer* 46. *Cook* 67 ; 239.

4. **T. Dinklagei** *Gilg* in Engl. Bot. Jahrb. 33 : 201 – Stapf 574. Flowers large, white ; in moist places.
Liberia : Grand Bassa (Sept.) ! Exsicc.—*Dinklage* 2049.

5. **T. podotricha** *Gilg* l.c. 200. A tall climbing shrub or medium-sized tree, found in the forest.
S. Nigeria : Lagos Colony ! Eket ! Cross River (Feb.) ! Also in Cameroons, Congo and Angola. Exsicc.—*Moloney. Mc Leod. Talb.* (no number).

6. **T. djalonica** *A. Chev.* Bot. 4, name only.
French Guinea : Between Mamou and Dalaba (fr. Dec.). Exsicc.—*Chev.* 20247.

7. **T. affinis** *Hutch.* in Kew Bull. 1923 : 180. A small tree, with yellowish-white flowers.
Gold Coast : Akwapim Hills (Oct.) ! Exsicc.—*Johnson* 796.

8. **T. eriantha** *Hutch.* l.c. 181. *T. obtusata* Planch. var. *eriantha* Oliv.—F.T.A. 1 : 12. A small tree, up to 30 ft. high. Flowers yellowish-white ; calyx green.
S. Nigeria : Oban ! Fernando Po (Dec.) ! Exsicc.—*Talb.* 1320. *Mann* 79.

48. PITTOSPORACEAE

Trees or shrubs. Leaves alternate, simple ; stipules absent. Flowers actinomorphic, hermaphrodite. Sepals 5, imbricate, free or nearly so. Petals 5,

FIG. 65.—PITTOSPORUM DALZIELII *Hutch.* (PITTOSPORACEAE).

A, portion of leaf. B, section of a petiole. C, capsule, showing inner face of the valves. D, capsule, outer face. E, seed.

longer than the sepals, imbricate, free or united at the base. Stamens 5, hypogynous, free, alternate with the petals ; anthers 2-celled, opening lengthwise. Ovary 1-celled with parietal placentas or 2–5-celled and the placentas meeting in the middle, superior, sessile or shortly stipitate ; style simple, terminal ; ovules numerous. Fruit a loculicidal capsule with the placentas in the middle of the valves, or indehiscent. Seeds with hard endosperm and minute embryo.

Mostly an Australian family. Recognised by the woody habit, definite stamens, usually parietal placentas, mostly 2-valved capsule, and seeds with copious endosperm and minute embryo.

PITTOSPORUM Banks—F.T.A. 1 : 124.

Shrubs or small trees ; leaves often undulate on the margin. Sepals free or slightly connate. Petals sometimes coherent at the base. Ovary usually imperfectly 2–5-celled. Capsule mostly 2-valved with the placentas in the middle of the valves. Seeds smooth, often black, surrounded by a viscous pulp.

Leaves oblanceolate or obovate-oblanceolate, acute at each end, 6–12 cm. long, 2–5 cm. broad, with undulate margins, finely reticulate above ; petiole slender, up to 3 cm. long ; inflorescence shorter than the leaves, the rhachis pubescent ; sepals ovate-

oblong, about 1·5 mm. long, minutely ciliate ; petals about 4 mm. long, connivent at the base ; valves of the fruit almost orbicular, markedly transversely rugose inside but not outside, 0·5–0·7 cm. long, capped by the divided style 1. *Mannii*

Leaves broadly oblanceolate, acutely acuminate, 8–15 cm. long, 3–5 cm. broad, obscurely reticulate ; petiole stouter, very narrowly winged, about 2 cm. long ; flowers not seen ; valves of the fruit almost orbicular, 5–7 mm. long, transversely rugose on both sides, capped by the rather short divided style .. .. 2. *Dalzielii*

1. **Pittosporum Mannii** *Hook. f.*—F.T.A. 1 : 124. A tree, 30 ft. high ; corolla yellow ; fruit scarlet. Cameroons Mt., 4,000–7,500 ft. (Dec.) ! Fernando Po, 8,500 ft. (April, Dec.) ! Exsicc.—*Mann* 386 ; 640 ; 1202 ; 2186. *Kalbreyer* 120.

2. **P. Dalzielii** *Hutch.* in Kew Bull. 1927, ined. A tree ; fruit scarlet. N. Nigeria : R. Koriga (Feb.) ! Exsicc.—*Dalz.* 417.

49. BIXACEAE

Shrubs or small trees with coloured juice. Leaves alternate, simple, palminerved, stipulate. Flowers hermaphrodite, medium-sized, showy, paniculate. Sepals 5, imbricate, deciduous, with a large fleshy gland at the base outside. Petals 5, large, imbricate, without a scale at the base. Disk none. Stamens numerous, hypogynous ; filaments free ; anthers horse-shoe-shaped, opening by short slits at the top. Ovary superior, 1-celled, with 2 parietal placentas ; ovules numerous ; style slender, recurved in bud ; stigma 2-lobed. Fruit a densely echinate-setose or smooth capsule, 2-valved ; valves thick, with the placentas in the middle. Seeds obovoid ; testa rather fleshy, red ; endosperm copious ; embryo large ; cotyledons broad, incurved at the apex.

A family now restricted to the single genus *Bixa*, with numerous stamens and horse-shoe-shaped anthers, parietal placentas, and 2-valved capsule.

BIXA Linn.—F.T.A. 1 : 113.

Characters of the family.

Branches and rhachis of the inflorescence covered with small rusty scales ; leaves slightly cordate at the base, acutely acuminate, entire, up to 20 cm. long and about 12 cm. broad ; flowers about 2·5 cm. long, pinkish-white, in terminal panicles ; fruit narrowly ovoid, pointed, about 4 cm. long, densely covered with stiff slender bristles, opening into 2 divergent valves ; seeds covered with a red pulp .. .. *Orellana*

B. Orellana *Linn.*—F.T.A. 1 : 114 ; Holl. 1 : 57 ; Chev. Bot. 36.
An introduced plant from tropical America. "Arnatto" or "Annatto." (See Appendix).

50. COCHLOSPERMACEAE

Trees, shrubs, or rhizomatous subshrubs, with coloured juice. Leaves alternate, palmatilobed, stipulate. Flowers hermaphrodite, showy, paniculate or racemose. Sepals 5, imbricate, deciduous. Petals 5, imbricate or subcontorted, alternate with the sepals. Stamens numerous, the filaments free, equal or some longer than the others ; anthers 2-celled, linear, opening by terminal short often confluent pore-like slits. Ovary 1-celled, with parietal placentas projecting into the cell, or perfectly 3-celled ; ovules numerous ; style simple, with minutely denticulate stigma. Fruit a 3–5-valved capsule. Seeds glabrous or covered with woolly hairs, straight or cochleate-reniform ; endosperm copious ; embryo conforming to the shape of the seed, large ; cotyledons broad.

A small family of two genera formerly included under *Bixaceae*. Note the anthers opening by pores and the usually hairy seeds on parietal placentas.

COCHLOSPERMUM Kunth—F.T.A. 1 : 112.

Low shrubs. Leaves palmately lobed, variable. Sepals 5, unequal. Petals 5, large, imbricate. Stamens numerous, with linear anthers on slender equal filaments. Ovary with 3–5 parietal placentas ; style slender. Fruit an obovoid often hairy capsule ; endocarp rather membranous. Seeds covered with long cottony hairs on a membranous outer testa, inner testa hard and shining.

Stems from a woody rootstock with coloured juice ; usually the flowers appearing before the leaves ; leaves very variable, more or less deeply lobed, 5–10 cm. long, shortly pubescent or subtomentose below ; flowers up to 8 cm. in diam., bright yellow ; ovary glabrous or tomentose ; capsules about 7 cm. long, narrowed to the base 1. *tinctorium*

Stems very slender, like the leaves quite glabrous ; lobes of the leaves linear-lanceolate ; flowers more or less solitary, smaller than in the preceding species 2. *niloticum*

1. **Cochlospermum tinctorium** *A. Rich.*—F.T.A. 1 ; 113 ; Guill. & Perr. Tent. Fl. Seneg. t. 21 ; Holl. 1 : 57 ; Chev. Bot. 36. Flowers commonly appearing near the ground after the annual bush-fires and before the leafy stems appear.
Common throughout the area in open country, and extending into Ubangi-Shari-Chad. **Rootstock a** well-known yellow dye. (See Appendix).

2. **C. niloticum** *Oliv.*—F.T.A. 1 : 113 ; Chev. Bot. 35. Habit of the preceding and sometimes found along with it.
Dahomey : Atacora Mts., 1,350–1,800 ft. (June) ! Also in Nile Land. Exsicc.—*Chev.* 24026 ; 24269.

Fig. 66.—Cochlospermum tinctorium *A. Rich.* (Cochlospermaceae).

A, B, C, leaves. D, anther. E, ovary. F, cross-section of ovary. G, seed. H, longitudinal section of seed.

51. FLACOURTIACEAE

With T. F. Chipp

Trees or shrubs. Leaves simple, alternate ; stipules often soon falling off. Flowers hermaphrodite or unisexual, often dioecious or polygamous, variously arranged. Sepals sometimes not distinguishable from the petals, imbricate or open in bud. Petals sometimes not arranged regularly in relation to the sepals, large, small or absent, with or without an opposite scale inside the base, imbricate. Stamens numerous, rarely few, hypogynous, free ; anthers 2-celled, often short, opening lengthwise by slits. Ovary 1-celled, with one or more parietal placentas, or rarely the placentas meeting in the middle ; ovules 2 or more on each placenta ; styles or stigmas as many as the placentas. Fruit indehiscent, mostly a berry or drupe, very rarely a capsule, sometimes large. Seeds with fleshy endosperm and medium-sized embryo ; cotyledons often broad.

Mainly in the tropics and subtropics, and formerly included in the *Bixaceae*, but differing by their straight anthers opening lengthwise by slits, and by the frequently unisexual flowers.

Leaves never hooked at the apex :
Inflorescence not adnate to the midrib of the leaf :
Perianth spiral or without differentiation into sepals and petals :
Inner perianth with scales adnate to the inner surface :
Stamens numerous, with long sometimes pointed anthers ; style 1 **1. Dasylepis**
Stamens 5 ; styles 3 .. .. **2. Scottellia**
Inner perianth without scales .. .. **3. Camptostylus**
Perianth cyclic, differentiated into sepals and petals or the latter absent :
Petals present :
Shrubs or small trees, armed with stout straight or recurved spines ; petioles short **4. Oncoba**
Unarmed trees and shrubs ; petioles often elongated :
Flowers large, in short axillary inflorescences ; stigma crenate or branched ; seeds small, numerous ; leaves scaly or thinly hairy .. .. **5. Caloncoba**
Flowers small, in long axillary inflorescences ; stigma undivided or slightly lobed ; seeds few or often only 1 at maturity ; leaves not scaly .. **6. Lindackeria**
Petals absent :
Sepals imbricate ; styles more or less spreading ; seeds glabrous :
Flowers dioecious in short racemes or glomerules ; fruit a berry ; stamens numerous .. .. **7. Flacourtia**
Flowers hermaphrodite or polygamous in lax terminal panicles ; fruit a capsule ; stamens 5–6 .. .. **8. Ophiobotrys**
Sepals scarcely imbricate ; styles erect or suberect ; seeds often villous ; stamens numerous .. .. **9. Dovyalis**
Inflorescence adnate to the midrib of the leaf, the latter large and elongate-oblanceolate **10. Phyllobotryum**
Leaves (or some of them) ending in a pair of recurved tendril-like hooks : seeds (where known) flattened, with a broad orbicular wing .. .. **11. Dioncophyllum**

1. DASYLEPIS Oliv.—F.T.A. 1 : 123.

Flowers racemose :
Pedicels about 1 cm. long ; flowers laxly arranged ; leaves elliptic, shortly cuneate at the base, obtusely acuminate, 12–20 cm. long, 6–9 cm. broad, distantly serrate, closely reticulate .. .. **1.** *racemosa*
Pedicels about 2 mm. long ; flowers crowded ; leaves oblong-elliptic, shortly cuneate, gradually acuminate, 12–18 cm. long, 5–7 cm. broad, obscurely serrate ; petiole tumid at the apex .. .. **2.** *brevipedicellata*
Flowers more or less spicate ; leaves oblong-elliptic, rounded or very slightly cuneate at the base, abruptly and shortly acuminate, 12–20 cm. long, 6–9 cm. broad, minutely denticulate or subentire, prominently reticulate on both surfaces, the midrib sharply prominent below ; petiole 1·5–2 cm. long, slightly tumid in the upper half ; ovary shortly hairy on the angles ; fruits quadrangular with smaller intermediate ridges .. .. **3.** *Blackii*
Flowers more or less spicate ; leaves oblong-elliptic, rounded at the base, rather long and broadly acuminate, about 12 cm. long, 4–5 cm. broad, thin, dentate, with about 5 lateral nerves and loosely reticulate ; petiole 0·5 cm. long ; ovary glabrous **4.** *assinensis*

1. **D. racemosa** *Oliv.*—F.T.A. 1 : 123. A tree, up to 25 ft. high.
Cameroons Mt., 2,000–3,000 ft. (Dec.) ! Exsicc.—*Mann* 2149.
2. **D. brevipedicellata** *Chipp* in Kew Bull. 1923 : 265. A glabrous shrub or tree (?), with coriaceous leaves.
Gold Coast : Ashanti, Mim (April) ! Exsicc.—*Thompson* 52.
3. **D. Blackii** *Chipp* l.c. *Pyramidocarpus Blackii* Oliv.—F.T.A. 2 : 495. A tree, 25 ft. high, with glabrous cylindrical branches.
S. Nigeria : Oban ! Also in Spanish Guinea. Exsicc.—*Talb.* 1274.
4. **D. assinensis** *A. Chev.* Bot. 39. name only. A shrub or tree (?).
Ivory Coast : Assinie (April) ! Exsicc.—*Chev.* 17872.

2. SCOTTELLIA Oliv. in Hook. Ic. Pl. t. 2265 (1893).

Rhachis of raceme stout, 14–20 cm. long ; petals pilose on the margin ; leaves entire, apex abruptly and obtusely acuminate, base rounded to subcordate ; sepals not prominently veined .. .. **1.** *leonensis*
Rhachis of raceme slender, up to 8 cm. long :
Leaf-margin unequally serrate from base to apex ; petiole 1–1·5 cm. long ; bracts 1–2 mm. long ; scales almost reduced to a few stiff setae at the base of the inner perianth **2.** *Chevalieri*
Leaf-margin entire or irregularly dentate towards the apex :
Leaf-base rounded or subcordate ; petiole 0·5 cm. long ; bracts 0 ; sepals and petals at length abruptly reflexed .. .. **3.** *kamerunensis*
Leaf-base wedge-shaped or obtuse ; petiole 0·5–3 cm. long ; flowers not known **4.** *coriacea*

1. **Scottellia leonensis** *Oliv.* in Hook. Ic. Pl. t. 2265. *S. macropus* Gilg et Dinkl. A large tree, common in the forest; flowers white, strongly scented.
Sierra Leone: Samu country; Luseniya! Hangha (Sept.)! Liberia: Grand Bassa! Exsicc.—*Sc. Elliot* 4065. *Dinklage* 2089. (See Appendix).
2. **S. Chevalieri** *Chipp* in Kew Bull. 1923: 265. *S. kamerunensis* A. Chev. Vég. Util. Afr. Trop. Franc. 5: 148, not of Gilg. A small tree, with white flowers.
Ivory Coast: Kaplécrou (Jan.)! Sassandra Port (May). Exsicc.—*Chev.* 16182.
3. **S. kamerunensis** *Gilg* in Engl. Bot. Jahrb. 40: 447. A tree, with 60–80 ft. bole and girth 5–6 ft.; buttresses small; flowers white.
S. Nigeria: Oni, Ondo Forest! Also in Cameroons. Exsicc.—*Sankey* 16. (See Appendix).
4. **S. coriacea** *A. Chev.* Bot. 39, name only. A tree, 70 ft., with rough grey bark and pale-yellow wood.
Ivory Coast: Alépé (fr. Mar.)! Yapo (Oct.)! Exsicc.—*Chev.* 16231.

3. CAMPTOSTYLUS Gilg in Notizbl. Bot. Gart. Berl. 2: 57 (1898).

Branches glabrous; leaves elliptic, shortly cuneate at the base, abruptly and obtusely acuminate, 12–15 cm. long, 4–7 cm. broad, entire, glabrous; lateral nerves about 6 pairs, laxly reticulate below; petiole 2·5 cm. long; sepals 3, almost membranous,

FIG. 67.—ONCOBA SPINOSA *Forsk.* (FLACOURTIACEAE).
A, flower-bud. B, stamen. C, ovary with style. D, cross-section of ovary. E, part of section of fruit. F, seed, entire and in longitudinal section.

glabrous; fruit narrowly ellipsoid-lanceolate, with 4–5 double longitudinal ribs, about 6 cm. long .. .. *ovalis*

C. ovalis *Chipp* in Kew Bull. 1923: 266. *Oncoba ovalis* Oliv.—F.T.A. 1: 118. *Camptostylus caudatus* Gilg. A tree, 25–30 ft. high.
Cameroons Mt., 4,000 ft. (fl. Dec., fr. Feb.)! Exsicc.—*Mann* 1196.

4. ONCOBA Forsk.—F.T.A. 1: 114, emend.

Young shoots and leaves pubescent or hairy, with spines more or less recurved and 1·5 cm. long; leaves elliptic, ovate to obovate, shortly acuminate, crenato-serrate, 5–10 cm. long, 3·5–6 cm. broad; petioles up to 5 mm. long; flowers on short lateral shoots, about 5 cm. diam.; calyx finally falling away; anthers not apiculate; stigma with about 6 radiate lobes; fruit globose, 5 cm. in diam., smooth
1. *brachyanthera*

A glabrous shrub or tree with straight spines several cm. long; leaves elliptic, shortly acuminate, serrulate or crenate-serrate, up to 9 cm. long and 5 cm. broad; petioles up to 1 cm. long; flowers white, fragrant, 5 cm. in diam., terminal or lateral on short axillary shoots; calyx usually persistent; anthers apiculate; fruit globose, smooth, 5 cm. in diam. .. .. 2. *spinosa*

1. **O. brachyanthera** *Oliv.*—F.T.A. 1: 116; Stapf 578; Chev. Bot. 37. A shrub or tree, up to 30 ft. high, with handsome white sweet-scented flowers somewhat resembling the wild rose.
Sierra Leone: Bagroo R. (fl. and fr. April)! Limba, Kabusa (April)! Freetown! Liberia: Sinoe Basin! Ivory Coast: Sanvi (Mar.); Haute-Sassandra (May); Morénou (Nov.)! Exsicc.—*Mann.* 829. *Sc. Elliot* 5477.

2. **Oncoba spinosa** *Forsk.*—Guill. & Perr. Tent. Fl. Seneg. t. 10; F.T.A. 1 : 115; Holl. 1 : 58. A shrub or small tree, with flowers as above.
Fairly common throughout the area, and extending to Eastern Sudan, Angola, Central, East and South Africa. Exsicc.—*Mann* 916. *Barter* 884; 3396. *Kersting* 590. (See Appendix).

5. CALONCOBA Gilg in Engl. Bot. Jahrb. 40 : 458 (1908).

Flowers small, about 4 cm. in diam., in axillary or extra-axillary racemes; leaves elliptic, abruptly and obtusely acuminate, 17–28 cm. long, 8–14 cm. broad; petioles 3–5 cm. long; flower-buds 1 cm. long; pedicels 1–1·5 cm. long; petals 1·5–2 cm. long; anthers linear, cells slightly interrupted, shortly apiculate .. .. 1. *Mannii*

Flowers terminal, axillary, solitary or fascicled, not in racemes:

Petioles 2–3 cm. long:

Pedicels 2 cm. long; leaves oval-oblong, base rounded to wedge-shaped, apex abruptly sharply acuminate, 10–30 cm. long, 4–10 cm. broad; main lateral nerves 5–6 on each side at an angle of 80° with the midrib; fruit echinate 2. *echinata*

Pedicels 4 cm. long; leaves obovate-oblong, base wedge-shaped, apex abruptly shortly acuminate, 12–20 cm. long, 4·5–7 cm. broad; main lateral nerves 7–8 on each side, at an angle of 50°–60° with the midrib; sepals 3 cm. long, 2 cm. broad; petals 6 cm. long, 2·5 cm. broad; fruits ellipsoid, beaked .. .. .. 3. *brevipes*

Pedicels 7 cm. long; leaves ovate-oblong, base obtuse, apex shortly acuminate, 10–18 cm. long, 4–8 cm. broad; main lateral nerves 6–7 on each side, at an angle of 70° with the midrib; sepals 1 cm. long; petals 3 cm. long; anthers linear, without a terminal appendage; stigma obtuse, undivided or denticulate; fruit with longitudinal undulate ridges .. .. 4. *lophocarpa*

Petioles 3–5 cm. long; leaves ovate or obovate with long sharp acumen, base rounded, 13–18 cm. long, 5–8 cm. broad; main lateral nerves 5–6 on each side; flowers white, with densely scaly pedicels; sepals round, densely scaly outside, about 2·5 cm. long; petals 12, about twice as long as the sepals .. .. .. 5. *Dusenii*

Petioles up to 14 cm. long; fruit smooth:

Branches almost defoliated at flowering; pedicels 1·5–2·5 cm. long; sepals not deciduous; stigma-branches linear-oblong; fruit depressed at the apex 6. *Gilgiana*

Branches leafy at flowering; leaves elliptic, glaucous above, apex sharply acuminate, 17–24 cm. long, 6–8 cm. broad; main lateral nerves 7–8 on each side, at an angle of 50° with the midrib; pedicels 3–11 cm. long; sepals early deciduous; petals 3–6 cm. long; stigma 5-dentate; fruit shortly acuminate at the apex .. 7. *glauca*

1. **C. Mannii** *Gilg* in Engl. Bot. Jahrb. 40 : 462 (1908). *Oncoba Mannii Oliv.*—F.T.A. 1 : 117. A tree, up to 50 ft. high, with white flowers and hard red wood.
S. Nigeria: Calabar R. (Feb.)! Oban! Eket. Ambas Bay (Feb.)! Victoria! (Mar.). Fernando Po (Jan.)! Also in French Cameroons. Exsicc.—*Mann* 11; 155; 2257. *Talb.* 1492. *Preuss* 1379.
2. **C. echinata** *Gilg* l.c. 464. *Oncoba echinata* Oliv.—F.T.A. 1 : 118; Chev. Bot. 37. A small tree, up to 21 ft. high, with white flowers; fruit orange or reddish when ripe; seeds black; chiefly in forest regions.
French Guinea: Kouria (Oct.)! Farana (Jan.); Kissidougou (Feb.). Sierra Leone: Bagroo R. (fr. Apr.)! Limba, Bafodeya (fr. Apr.)! Hangha (Sept.)! Liberia: ? locality. Ivory Coast: Tano R. (July)! Anyama (Febr.); Cavally Basin (July). Gold Coast: Ashanti, Essiaman! Tano R. (July)! Exsicc.—*Mann.* 805. *Sc. Elliot* 5576. *Chev.* 14930. *Cook* 114. (See Appendix).
3. **C. brevipes** *Gilg* l.c. 459. *Oncoba brevipes* Stapf. A small tree, 15 or more ft. high; flowers white, 4 in. or more in diam.; fruits about 3 in. long, 5-grooved.
Sierra Leone: Juru (fr. Dec.)! Liberia: Monrovia! Sinoe Basin! Grand Bassa (Sept.)! Exsicc.—*Whyte.*
4. **C. lophocarpa** *Gilg* l.c. 462. *Oncoba lophocarpa* Oliv.—F.T.A. 1 : 118. *Paraphyadanthe lophocarpa* Gilg[1] in Engl. & Prantl Pflanzenfam., ed. 2, 21 : 401. A tree, 30–40 ft. high; flowers white, 2 in. or more in diam.
Cameroons Mt.: Buea, etc., 2,000–5,000 ft. (Dec.)! Exsicc.—*Mann* 1195; 2162.
5. **C. Dusenii** *Gilg* l.c. 459. A tree, up to 45 ft. high; flowers white.
S. Nigeria: Meme River (Oct.). Exsicc.—*Dusen* 66 (not seen).
6. **C. Gilgiana** *Gilg* l.c. 460—Chev. Bot. 38. *Oncoba Gilgiana* Sprague. A shrub or small tree, up to about 20 ft. high; flowers white, polygamous (male numerous, hermaphrodite few), about 4 in. in diam.; petals 9–12; fruits obovate-globose, about 2 in. long, 5–6-grooved.
Sierra Leone: Scarcies R. (Feb.)! Madina! Gold Coast: Koforidua (Mar.)! Kibbi (Dec.)! Nsawam to Swedru (June)! Ashanti, Kunso (Feb.)! Obuasi (Jan.)! Togo: Lome! S. Nigeria: Iddo (Dec.)! Lagos (Nov.–Feb., May, June)! Exsicc.—*Sc. Elliot* 4764. *Barter* 20136. *Warnecke* 84. (See Appendix).
7. **C. glauca** *Gilg* l.c. 459—Chev. Bot. 38. *Oncoba glauca* Hook. f. ex Planch. in Hook. Lond. Journ. Bot. 6 : 296 (1847)—F.T.A. 1 : 117. A tree, 20–40 ft.; flowers white, 4–5 in. in diam.; fruit edible.
Ivory Coast: Agniéby Valley (Jan.); Attié (Dec., Feb.). S. Nigeria: Cross River! Lagos Colony! Insofan (Jan.)! Awka! Oban! Calabar (Sept.)! Ambas Bay (fl. and fr. Feb.)! Fernando Po (Nov.)! Exsicc.—*T. Vogel* 115; 224. *Mann* 258. *Talb.* 1262. (See Appendix).

6. LINDACKERIA Presl Rel. Haenk. 2 : 89, t. 65 (1831).

Leaves oblong-elliptic to ovate, truncate, rounded or narrowed at the base, shortly acuminate, irregularly dentate or almost entire at the margin, 15–20 cm. long, 8–12 cm. broad; main lateral nerves 8–10 pairs; petioles 5–16 cm. long; inflorescence

1 Gilg (l.c.) has transferred *Caloncoba lophocarpa* to the genus *Paraphyadanthe* Mildbr., with some hesitation. We are very doubtful whether the latter genus can be maintained. Its type differed from *Caloncoba* by the remarkable geophilous habit of the flowers and by the anthers beginning to open by pore-like slits at the apex. This difference seems to be bridged by *Caloncoba Welwitschii* Gilg, which occurs from French Cameroons to Angola, and in which the flowers are borne on the main stems, and the anthers dehisce by a pore-like slit which eventually lengthens out towards the base of the cell—a character admitted by Gilg to occur in *Paraphyadanthe*.

5–10 cm. long, with flowers 5 mm. in diam. in fascicles of 3–5 ; sepals 3, 5 mm. long ; petals 6–10, up to 1 cm. long ; ovary hairy, becoming echinate in fruit 1. *dentata*
More or less as above, but leaves less distinctly acuminate, petals shorter up to 3 cm. long ; flowers solitary or paired on the axis .. .. .. 2. *Caillei*

1. **Lindackeria dentata** *Gilg* in Engl. Bot. Jahrb. 40 : 465 (1908)—Chev. Bot. 38. *Oncoba dentata* Oliv.—F.T.A. 1 : 119. A tree, up to 50 ft. high ; flowers white.
French Guinea : various localities ! Sierra Leone : Luoma (Jan.) ! Limba country (April) ! Gold Coast : Kwahu (April) ! Aburi (April) ! S. Nigeria : Onitsha ! Lagos Colony ! Obu ! Eket ! Oban ! Victoria (July) ! Cameroons Mt., 2,000–3,000 ft. (Feb.) ! Also in French Cameroons, Ubangi-Shari-Chad, Eastern Sudan, Gabon and Angola. Exsicc.—*Sc. Elliot* 5488 ; 5632. *Mann* 1177 ; 2267. *Barter* 1655. *Talb.* 1425. *Kalbreyer* 106.
2. **L. Caillei** *A. Chev.* Bot. 38. A tree, 18–25 ft. high ; flowers white, very fragrant.
French Guinea : Futa Jallon, bank of the Mafin at Dalaba (April) ! Exsicc.—*Caille* in *Herb. Chev.* 18147 ; 18148.

7. FLACOURTIA Commers.—F.T.A. 1 : 120.

Leaves more or less oval, generally rounded at the apex, but sometimes obtuse, venation reticulate.. .. .. 1. *flavescens*
Leaves oblong, apex acute, veins markedly parallel to each other between the nerves 2. *Vogelii*

FIG. 68.—OPHIOBOTRYS ZENKERI *Gilg* (FLACOURTIACEAE).
A, flower. B, C, stamens, front and back. D, ovary. E, cross-section of ovary.

1. **F. flavescens** *Willd.*—F.T.A. 1 : 121 ; Holl. 1 : 59 ; Chev. Bot. 38. A shrub or small tree, up to 25 ft. high ; berry red or purple, edible. Niger Plum.
Senegal ! Ivory Coast : Koualé (May) ! Mt. Kamouéniboka (July) ! Baoulé-Nord (July). Togo: Lome ! Dahomey : several localities (Feb., April, May) ! N. Nigeria : Nupe ! S. Nigeria : Lagos Colony (April) ! Abeokuta ! Oloke Meji ! Exsicc.— *Barter* 1687. *Warnecke* 320.
2. **F. Vogelii** *Hook. f.*—F.T.A. 1 : 121, under *F. flavescens* Willd. A shrub ; fruit a red berry.
S. Nigeria : Abo ! Ibo country ! Exsicc.—*T. Vogel* 34. *Barter* 162.

8. OPHIOBOTRYS Gilg in Engl. Bot. Jahrb. 40 : 514 (1908).

A tree ; young branches puberulous ; leaves elliptic, shortly cuneate at the base, obliquely acuminate at the apex, 7–14 cm. long, 2·5–5·5 cm. broad, entire, glabrous ; lateral nerves about 4 pairs, prominently looped ; petiole about 1 cm. long ; panicle with slender long branches, tomentellous ; flowers subsessile ; sepals obovate, 2 mm. long, glabrous ; stamens 5–6, alternate with the sepals ; disk-glands large and hairy ; ovary tomentose ; capsule 1·5 cm. long .. .. *Zenkeri*

O. **Zenkeri** *Gilg* l.c. 516, t. 2. Large timber-tree ; flowers whitish or pinkish-white.
Gold Coast : East Aklm (Jan.) ! S. Nigeria : Victoria. Also in French Cameroons. Exsicc.— *Johnson* 737, 739. *Winkler* 86.

9. DOVYALIS Arn. & E. Mey.—Gilg in Engl. Bot. Jahrb. 40 : 504.

Leaves oblong-elliptic, shortly and gradually acuminate, obtusely rounded at the base, about 6 cm. long and 2·5 cm. broad, pubescent on the nerves and petiole ; spines 1·5 cm. long, straight ; male flowers in axillary fascicles ; fruits more or less globose, fleshy, about 3 cm. diam., with reflexed sepals at the base .. .. .. 1. *Afzelii*

Leaves ovate-elliptic, acutely and fairly long-caudate-acuminate, mostly rather broadly rounded at the base, up to 9 cm. long and 5 cm. broad, minutely puberulous on the nerves ; spines up to 2 cm. long ; male flowers in axillary fascicles, hoary-pubescent 2. *Zenkeri*

1. **Dovyalis Afzelii** *Gilg* in Engl. Bot. Jahrb. 40 : 507 (1908). A shrub or spiny tree.
Sierra Leone : near Regent (fr. Dec.) ! Exsicc.—*Sc. Elliot* 4008. *Afzelius* (not seen).
2. **D. Zenkeri** *Gilg* l.c. A shrub or small tree, 12–18 ft. high, more or less densely spiny.
S. Nigeria : Oban ! Also in Cameroons. Exsicc.—*Talb.* 1261.

10. PHYLLOBOTRYUM Muell. Arg.—DC. Prodr. 15, 2 : 1231.

A shrub ; branchlets not seen ; leaves large, elongate-obovate-oblanceolate, cuspidate-acuminate, gradually narrowed to the scarcely petiolate base, up to 1 m. long and 15 cm. wide, crenulate-serrate, with numerous spreading lateral nerves, glabrous ; inflorescence completely adnate to the upper surface of the midrib up to ⅔ of its

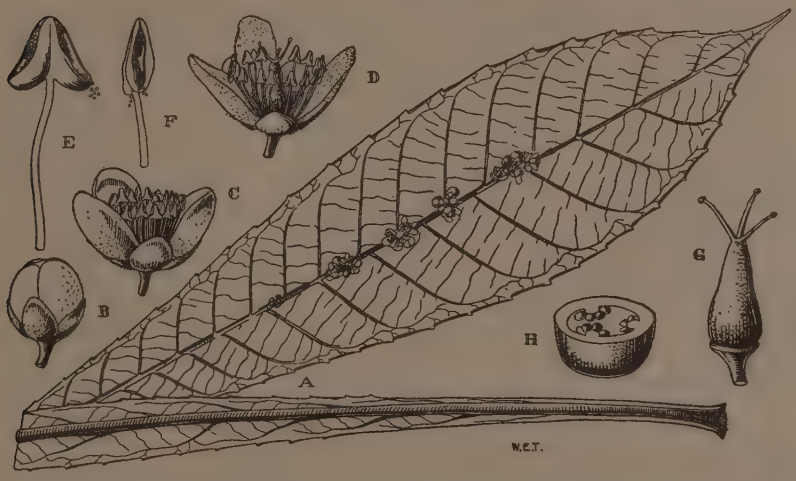

FIG. 69.—PHYLLOBOTRYUM SOYAUXIANUM *Baill.* (FLACOURTIACEAE).
A, leaf with adnate inflorescence. B, flower-bud. C, male flower. D, hermaphrodite flower. E, F, stamens. G, ovary with styles. H, ovary in cross-section.

length ; flowers small, clustered, shortly pedicellate, polygamous ; sepals shortly ciliate .. .. *Soyauxianum*

P. Soyauxianum *Baill.* in Bull. Soc. Linn. Par. 1 : 287. *P. Zenkeri* Gilg. *P. spathulatum* Bak. f. in Cat. Talb. Nig. Pl. 121, not of Muell. Arg.
S. Nigeria : Oban ! Johann-Albrechtshöhe (fl. and fr. Mar.) ! Also in French Cameroons and Gabon. Exsicc.—*Talb.* 24 ; 26. *Staudt* 865.
A remarkable genus formerly included in the *Euphorbiaceae*, but now correctly placed in the *Flacourtiaceae*. Fruits are still unknown.

11. DIONCOPHYLLUM Baill. in Bull. Soc. Linn. Par. 2 : 870 (1890).

Leaves linear-oblong, subacute at the base, up to 27 cm. long and 5·5 cm. broad, papery, glabrous, with very numerous lateral nerves prominent on both surfaces ; midrib raised above and below, prolonged at the apex into a pair of tendril-like hooks ; leaves in the inflorescence elliptic, much shorter than the others ; bracts leafy ; calyx-lobes 5, closed in bud, nearly 1·5 cm. long, rusty-tomentellous ; seeds orbicular, depressed, winged all round, about 9 cm. in diam. .. .. 1. *Dawei*

Leaves oblanceolate, rather long-attenuated to the base, up to 15 cm. long and 3·5 cm. broad, subcoriaceous, glabrous, with very indistinct lateral nerves ; midrib more prominent above than below, sometimes prolonged at the apex into two thick recurved hooks ; bracts small ; calyx cupular, open in bud, 5-toothed ; stamens 10 ; capsule (young) about 2 cm. long ; seeds orbicular, about 7 cm. in diam., with a central body concave on one side, convex on the other, the wing radiately nerved and crenulate on the margin .. .. 2. *peltatum*

FIG. 70.—DIONCOPHYLLUM DAWEI *Hutch. & J. M. Dalz.* (FLACOURTIACEAE).

A, portion of leaf showing lower surface. B, flower-bud. C, sepal. D, petal. E, stamens. F, anther. G, open flower. H, the same. I, longitudinal section of same. J, transverse section of ovary.

1. **Dioncophyllum Dawei** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A climbing shrub, with rusty-puberulous striate branches.
Sierra Leone: Mano Bonjuma, sandy soil (Feb.)! Exsicc.—*Dawe* 466.
2. **D. peltatum** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. Climber, 40–60 ft.; stems 4 in. in diameter; branches glabrous.
Sierra Leone: Matotaka! Exsicc.—*Thomas* 1287 (partly). *Lane-Poole* 186.

52. SAMYDACEAE

Trees or shrubs. Leaves simple, alternate, often pellucid-dotted or lined; stipules small, deciduous or absent. Flowers hermaphrodite, actinomorphic, perigynous. Sepals united in the lower part, imbricate or valvate, persistent. Petals the same number or more than the sepals or absent, often persistent. Disk-glands alternate with the stamens. Stamens definite or indefinite in number, in one or more rows, sometimes in bundles opposite the petals; staminodes often present; filaments free or connate at the base; anthers 2-celled, short, opening lengthwise. Ovary free or adnate to the calyx-tube, sessile, 1-celled with 3–5 parietal placentas often towards the top of the cell; style simple or 3–5 distinct styles; ovules few or numerous. Fruit capsular or indehiscent. Seeds with fleshy copious endosperm and fairly large embryo.

Mainly a tropical family and very similar to the *Flacourtiaceae*, with which they have often been united; distinguished from that family by the constantly hermaphrodite perigynous flowers which are mainly provided with persistent petals.

Petals present; ovary partly adnate to the calyx-tube:
Petals twice as many as the sepals; stamens very numerous; filaments pilose; stipules fairly large, falcate, deciduous .. .. 1. **Dissomeria**
Petals the same number as the sepals; stamens few or many; filaments not pilose:
Petals persistent, becoming dry, spreading and often enlarged in fruit, not hooded; stamens singly or in bundles opposite the petals; stipules small 2. **Homalium**
Petals not enlarged in fruit, often connivent, hooded, with inflexed margins; stamens alternate with and opposite the petals; stipules absent.. .. 3. **Byrsanthus**
Petals absent; ovary free; staminodes alternate with the fertile stamens; stipules minute .. .. 4. **Casearia**

1. DISSOMERIA Benth.—F.T.A. 2 : 496.

Branchlets pubescent when young, at length marked by numerous lenticels; leaves elliptic to obovate-elliptic, obtusely cuneate at the base, obtuse or shortly acuminate, 6–11 cm. long, 3–6 cm. broad, glabrous except in the axils of the nerves, crenate with gland-tipped teeth; lateral nerves 5–7 pairs, prominent below; petiole about 4 mm. long; stipules 5–6 mm. long, caducous; spikes axillary, about as long as the leaves; flowers crowded; sepals ciliate; petals softly pubescent outside; filaments plumose .. .. *crenata*

D. crenata *Benth.*—F.T.A. 2 : 496. A shrub or tree, up to 30–40 ft. high, with white flowers.
Sierra Leone: Farana (Mar.)! Makunde (April)! Sugar Loaf (April)! Mano! Gold Coast: between Ejura and Yeji (April)! N. Nigeria: Lokoja (Sept.)! Exsicc.—*Sc. Elliot* 5313; 5706; 5768. *Ansell* 1.

2. HOMALIUM Jacq.—F.T.A. 2 : 497.

Leaves more or less permanently pubescent or tomentose all over the lower surface:
Lateral nerves 10–15, very prominent below and parallel; lower surface of the leaves tomentellous; petiole 1 cm. long; inflorescence solitary in the axils of the leaves; leaves broadly elliptic, rounded at the base, very shortly cuspidate at the apex, 7–12 cm. long, 3–8 cm. broad; flowers distinctly pedicellate .. 1. *Dalzielii*
Lateral nerves up to 10, not markedly parallel; leaves softly pubescent or pilose below; petiole not more than 0·5 cm. long:
Indumentum of the lower leaf-surface and rhachis of the inflorescence of long slender hairs; sepals linear-subulate; petals nearly 1 cm. long in fruit; leaves unequal-sided at the base, obliquely ovate-elliptic, shortly acuminate, 15–18 cm. long, 7–10 cm. broad, obtusely serrate .. .. 2. *djalonis*
Indumentum of the leaves softly pubescent and rhachis of the inflorescence tomentose; sepals very small; petals hardly more than 2 mm. long in fruit; leaves subequal-sided at the base, more or less oblong-elliptic, up to 17 cm. long and 9 cm. broad, rather shortly serrate .. .. 3. *mollo*
Leaves glabrous below or at most hairy in the axils of the lateral nerves or on the midrib:
Leaves cordate at the base, large, 12–30 cm. long, very coriaceous and with strong parallel tertiary nerves; stipules deciduous .. .. .. 4. *dolichophyllum*

Leaves rounded or cuneate but not cordate at the base :
Leaves small, more or less obovate, at most up to 10 cm. long and 4 cm. broad, with 4–6 pairs of lateral nerves .. .. 5. *angustifolium*
Leaves larger, usually well over 10 cm. long, more or less elliptic or rarely somewhat obovate, with more than 6 pairs of lateral nerves :
Leaves very coarsely crenate, broadly and shortly elliptic, cuneate at the base, abruptly acuminate, less than 12 cm. long ; flowers very shortly pedicellate ; petals in fruit up to 7 mm. long .. .. 6. *alnifolium*
Leaves more or less obscurely crenate or subentire, mostly oblong-elliptic, often much more than 12 cm. long :
Leaves distinctly cuneate at the base, 10–12 cm. long, 5–6 cm. broad ; pedicels much shorter than the flowers ; inflorescence much-branched 7. *Aylmeri*
Leaves rounded at the base :
Rhachis of the inflorescence with long spreading hairs as well as a short indumentum ; flowers distinctly pedicellate ; petals in fruit about 8 mm. long 8. *Smythei*
Rhachis of the inflorescence without long hairs ; flowers sessile or subsessile ; petals in fruit about 2 mm. long .. .. 9. *africanum*

FIG. 71.—HOMALIUM DOLICOPHYLLUM *Gilg* (SAMYDACEAE).

A, branch of the inflorescence. B, flower. C, D, stamens, front and back. E, ovary partly laid open showing placentas with ovules at the top.

1. **Homalium Dalzielii** *Hutch.* in Kew Bull. 1927, ined. A tree, up to 40 ft. high.
S. Nigeria : Lagos (Dec., Jan.) ! Iddo (Dec.) ! Exsicc.—*Millen* 42. *Dalz.* 1259 ; 1356.

2. **H. djalonis** *A. Chev.* Bot. 283, name only. A tree, with hairy branchlets.
French Guinea : Diaguissa Plateaux (April) ! Exsicc.—*Chev.* 12692.

3. **H. molle** *Stapf* in Journ. Linn. Soc. 27 : 100—Stapf 606 ; Chev. Bot. 283. *H. stipulaceum* Mast.—F.T.A. 2 : 498, not of Welw. A shrub or tree.
French Guinea : Boké (Mar.) ! Sierra Leone : Charlotte Falls (Mar.) ! Port Lokko (April) ! York Pass (July) ! Bagroo R. (April) ! Liberia : Monrovia ! Sinoe Basin ! Ivory Coast : Makougnié (Jan) ! Exsicc.—*Sc. Elliot* 5866. *Mann* 881. *Thomas* 9487 ; 9493 : 9697. *Pobéguin* 2013.

4. **H. dolichophyllum** *Gilg* ex *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *H. africanum* Gilg in Engl. Bot. Jahrb. 40 : 488, not of Benth. A tree, up to 50 ft. high.
French Guinea : Kouroussa (Jan.) ! Sierra Leone : Talla Hills (April) ! N. Nigeria : Lapai (Feb.) ! S. Nigeria : Onitsha ! Lagos Colony ! Oban ! * Fernando Po (Jan.) ! Also in Cameroons and Gabon. Exsicc.—*Sc. Elliot* 5532. *Thomas* 8496. *Talb.* 1419. *Mann* 232. *Pobéguin* 640.

5. **H. angustifolium** *Sm.*—F.T.A. 2 : 498. A small tree.
Sierra Leone : Talla Hills (Feb.) ! Sugar Loaf (Dec.) ! Colonial Reserve (Jan.) ! Bawbaw ! Kumala (June) ! Exsicc.—*Sc. Elliot* 4022 ; 4874 ; 5016. *Thomas* 467. *Vohsen* 9.

6. **H. alnifolium** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A tree, with alder-like leaves.
Sierra Leone : Pujehun (Feb.) ! Panguma (Mar.) ! Bunabu (Mar.) ! Makump (July) ! Mayoso (Aug.) ! S. Nigeria : near Modakeke ! Degema ! Exsicc.—*Lane-Poole* 16 ; 19 ; 141. *Foster* 206. *Talb.* 3791. *Thomas* 948 ; 1477.

7. **H. Aylmeri** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A large tree.
Sierra Leone : Kambui (Mar.) ! Exsicc.— *Aylmer* 580.

8. **H. Smythei** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A medium-sized tree.
Sierra Leone : Pujehun (Feb.)! Limba (April) ! Exsicc.—*Smythe* 55. *Aylmer* 7.

9. **Homalium africanum** *Benth.*—F.T.A. 2 : 497 ; Chev. Bot. 283. A tree, 60 ft. or more high, common in moist fringes, etc.
Sierra Leone : Pujehun (Mar.) ! Limba (April) ! Ivory Coast : Assinie (April) ; Yapo (Oct.). S. Nigeria : Lagos (Jan.) ! Atigere (Febr.) ! Oban ! Calabar ! Also in Cameroons and Spanish Guinea. Exsicc.—*Sc. Elliot* 5572. *Barter* 20165. *Millen* 146. *Talb.* 484.

3. BYRSANTHUS Guill.—F.T.A. 2 : 498.

Leaves lanceolate-elliptic to ovate-elliptic, obtuse or rounded at each end, 10–12 cm. long, 4–7 cm. broad, coriaceous, obscurely crenate, glabrous, shining, laxly reticulate on both surfaces ; lateral nerves 7–8 pairs, prominent on each side ; petiole 5–8 mm. long ; flowers paniculate ; rhachis with numerous clusters of small hairs ; calyx-lobes triangular, reflexed, about 2·5 mm. long, like the slightly larger petals covered with a short grey indumentum .. .. *Brownii*

B. **Brownii** *Guill.*—F.T.A. 2 : 499. *B. epigynus* Mast.—F.T.A. 2 : 499, partly. *Symmeria paniculata* Scott Elliot in Journ. Linn. Soc. Bot. 30 : 95, partly, not of Benth. A shrub or medium-sized tree, with rugose branches.
Gambia. French Guinea : Kissosso (July) ! Sierra Leone : several localities ! Exsicc.—*Sc. Elliot* 5074b ; 5662. *Thomas* 377 ; 1286 ; 1404 ; 1572 ; 4673 ; 8214. *Aylmer* 65. *Poéguin* 785.

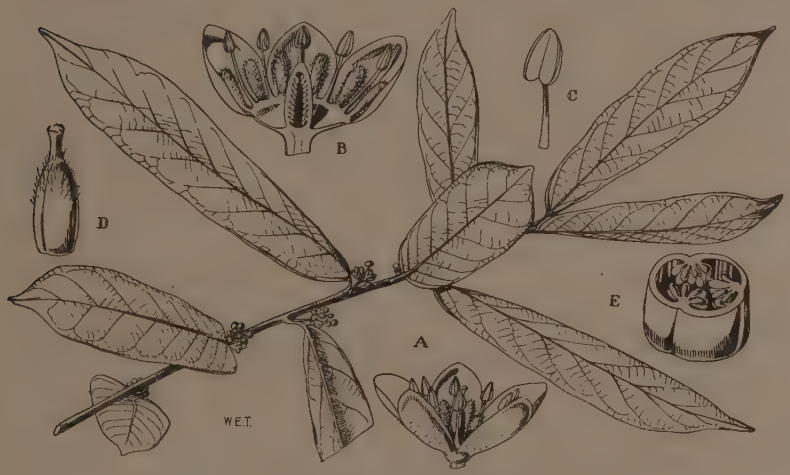

FIG. 72.—CASEARIA STIPITATA *Mast.* (SAMYDACEAE).
A, flower. B, the same opened out with vertical section of ovary. C, stamen. D, ovary. E, cross-section of ovary.

4. CASEARIA Jacq.—F.T.A. 2 : 493.

Flower-clusters shortly pedunculate ; branchlets shortly pubescent ; leaves oblong, rounded and slightly oblique at the base, shortly acuminate, 10–16 cm. long, 3–6 cm. broad, slightly serrulate, slightly pubescent on the nerves when young ; lateral nerves about 10 pairs ; petiole about 5 mm. long ; sepals glabrous ; staminodes pubescent .. .. 1. *stipitata*

Flower-clusters sessile :
Leaf-blade unequal-sided at the base :
One half of leaf-blade inserted much lower than the other ; branches glabrous ; leaves oblong-lanceolate, acuminate, 10–12 cm. long, 3–3·5 cm. broad, crenate, glabrous ; lateral nerves about 7 pairs ; petiole 5–8 mm. long ; sepals glabrous ; staminodes villous .. .. 2. *inaequalis*
One half of leaf-blade not inserted above the other ; leaves obovate, cuneate on one side at the base, shortly and abruptly acuminate at the apex, 7–10 cm. long, 3·5–5·5 cm. broad ; lateral nerves about 6 pairs ; flowers not seen ; fruits oblong-ellipsoid, 4 cm. long, with the persistent reflexed calyx at the base 3. *Dinklagei*
Leaf-blade more or less equal-sided at the base :
Flowers distinctly pedicellate ; sepals glabrous ; leaves oblong-elliptic to obovate-elliptic, rounded or shortly cuneate at the base, shortly acuminate, 9–18 cm. long, 3·5–7 cm. broad, with the lateral nerves prominent only below, the tertiary nerves numerous and subparallel below .. .. 4. *Barteri*

Flowers nearly sessile ; sepals pubescent ; leaves obovate or obovate-elliptic, cuneate at the base, very shortly and obtusely acuminate, 7–9 cm. long, 4–5 cm. broad, the lateral nerves prominent on both sides, the tertiary nerves few and laxly reticulate below .. .. 5. *bridelioides*

1. **Casearia stipitata** *Mast.*—F.T.A. 2 : 493. A tree, about 20 ft. high.
S. Nigeria : Abo ! Exsicc.—*Barter* 322.
2. **C. inaequalis** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A medium-sized tree.
Sierra Leone : Bandajuma (May) ! Exsicc.—*Aylmer* 73.
3. **C. Dinklagei** *Gilg* in Engl. Bot. Jahrb. 40 : 511.
Liberia : Grand Bassa (fr. May) ! Exsicc.—*Dinklage* 1908.
4. **C. Barteri** *Mast.*—F.T.A. 2 : 494. *C. bule* Gilg l.c. 513. A shrub or tree, up to 50 ft. high.
S. Nigeria : Onitsha ! Degema ! Johann-Albrechtshöhe (Jan.) ! Ambas Bay (Jan.) ! Victoria (Mar., May). Also in French Cameroons. Exsicc.—*Barter* 1635. *Mann* 714. *Talb.* 1916. *Staudt* 799.
5. **C. bridelioides** *Mildbr.* ex *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A tall tree, with " straight bole of 60–80 ft. to the first branch, mature tree girth from 6–9 ft."
S. Nigeria : Oni R ! Also in Cameroons. Exsicc.—*Sankey* 17.

53. FRANKENIACEAE

Herbs or shrublets ; leaves opposite, exstipulate, often small and ericoid. Flowers actinomorphic, hermaphrodite, solitary or cymose, small. Sepals 4–6, persistent, connate, induplicate-valvate. Petals as many as the sepals, free, clawed, with a scale-like appendage on the inside, imbricate. Stamens usually 6, hypogynous, free or shortly connate at the base ; anthers 2-celled, didymous, dehiscing longitudinally. Ovary superior, sessile, 1-celled, with 2–4 parietal placentas ; ovules numerous ; style simple, filiform. Capsule enclosed in the persistent calyx, opening by valves. Seeds with endosperm ; embryo straight, axile.

Widely dispersed on maritime shores.

FRANKENIA Linn.—F.T.A. 1 : 136.

Characters of the family.

Leaves flat, obovate to almost orbicular, petiolate, about 3–5 mm. long, setulose-pubescent ; flowers terminal ; calyx 3–4 mm. long .. .. 1. *pulverulenta*

Leaves much revolute, 2–3 mm. long, like those of an *Erica*, and completely covered with a salty exudation which eventually partly falls off ; flowers mostly lateral ; calyx 2–3 mm. long .. .. 2. *thymifolia*

1. **F. pulverulenta** *Linn.*—F.T.A. 1 : 136 ; Guill. & Perr. Tent. Fl. Seneg. 40. A diffuse much-branched herb a few inches high, with opposite leaves, often covering the ground.
Senegal : Sor island, etc., in salt places (Oct.–Dec.) ! Maritime shores of the warmer parts of the Old World.
2. **F. thymifolia** *Desf.*—Chev. Bot. 44. A rigid densely leafy heath-like shrublet.
Various localities on the shores of Mauritania (Jan.–Mar.). Exsicc.—*Chev.* 18900 25416 (not seen).

54. TAMARICACEAE

Shrubs or trees, with slender branches and small scale-like alternate leaves ; stipules absent. Flowers very small, actinomorphic, usually hermaphrodite, in slender catkin-like spikes or racemes. Sepals 4–6, imbricate, free. Petals as many as the sepals, free. Disk present. Stamens hypogynous, 5–10, free or connate at the base ; anthers 2-celled, opening by longitudinal slits. Ovary superior, 1-celled, with parietal or basal placentas ; styles 3–4, free or united at the base ; ovules numerous, ascending. Fruit a capsule. Seeds with or without endosperm, with a tuft of hairs at the apex or all round ; embryo straight.

Temperate regions of Europe, N. Africa and Asia ; mostly maritime shores. Recognised by the scale-like leaves, minute flowers, definite stamens, disk, and the parietal or basal placentation.

TAMARIX Linn.—F.T.A. 1 : 151.

Stamens free or connate at the very base ; anthers extrorse. Seeds with a crest of long hairs at the apex.

A shrub or small tree ; branchlets slender ; leaves alternate, ovate-triangular, very acute, about 2 mm. long, distinctly gland-dotted, otherwise glabrous ; flowers very small in slender catkin-like racemes ; bracts shorter than the flowers
1. *senegalensis*

A shrub ; branchlets closely jointed ; leaves minute ; flowers in loose spikes ; bracts broadly triangular, with a sharp point .. .. 2. *articulata*

1. **Tamarix senegalensis** *DC.* Prodr. 3 : 96. *T. gallica* Oliv.—F.T.A. 1 : 151, not of Linn. ; Chev. Bot. 49. A twiggy maritime shrub or small tree.
Senegal : Mbidjem ! Sor Island ! Niayes (Dec.) ; marshes of the M'Baouan (Dec.) ; St. Louis (Nov.). Also in Cape Verde Islands. Exsicc.—*Thierry* 28. *Brunner. Farmar* 115. *Chev.* 2722 ; 2723 ; 2724.
2. **T. articulata** *Vahl* Symb. Bot. 2 : 48. t. 32—Chev. Bot. 49. as *T. passerinoides* Del. ? Like the preceding.
Mauritania : El Fares ! Exsicc.—*Schmitt* in *Herb. Chev.* 28605. (See Appendix).

55. PASSIFLORACEAE

Herbaceous climbers bearing tendrils, or erect trees or shrubs. Leaves alternate, entire or lobed, often with a glandular petiole ; stipules usually small and deciduous. Flowers hermaphrodite or unisexual. Sepals 5, imbricate, persistent, free or partially united. Petals 5, rarely absent, free or shortly united, imbricate. Corona of one or more rows of thread-like processes or scales, or annular. Stamens 5 or more, hypogynous or perigynous, shortly united or in bundles, sometimes springing from the gynophore ; anthers 2-celled, opening lengthwise. Ovary superior, 1-celled, with 3 or rarely 4–5 parietal placentas ; ovules usually numerous ; styles free or united ; stigmas often capitate. Fruit a capsule or berry, indehiscent or loculicidally 3-valved. Seeds with pitted testa, surrounded by a pulpy aril ; endosperm fleshy ; embryo large, straight.

Almost exclusively tropical and subtropical. Recognised by the usually climbing habit (the African representatives, however, are mainly trees and shrubs), alternate stipulate leaves often with a pair of glands at the base, the flowers provided with a corona, the superior 1-celled ovary with parietal placentas, and pitted seeds.

Carica Papaya Linn., the Papaw, a native of America and now referred to a separate family *Caricaceae*, is cultivated everywhere and sometimes naturalised in abundance in forest areas. It may be recognised by its milky juice, and alternate leaves crowded at the top of the stem and palmately lobed or divided. Fruit resembling a lobed melon, edible. (See Appendix).

Flowers hermaphrodite ; corona conspicuous :
Styles free to the base or nearly so :
Anthers peltate, 4-celled ; flowers in elongated axillary spikes or racemes ; stamens numerous ; tendrils absent ; stipules present .. .. .. 1. **Soyauxia**
Anthers 2-celled, basifixed or versatile :
Tendrils present ; stamens 4–5, filaments partly adnate to a long gynophore ; fruit stipitate ; climber .. .. 2. **Passiflora**
Tendrils absent ; trees or shrubs :
Stamens numerous ; flowers large and conspicuous, axillary .. 3. **Smeathmannia**
Stamens 5 ; flowers rather small :
Flowers solitary or fasciculate in the leaf-axils or from the axils of the fallen leaves ; leaves not glandular at the base .. .. .. 4. **Paropsia**
Flowers in terminal panicles ; leaves with a pair of large glands at the base 5. **Androsiphonia**
Styles united ; stigma capitate :
Fertile stamens numerous ; flowers sessile, surrounded by numerous imbricate bracts ; no tendrils .. .. 6. **Barteria**
Fertile stamens 5, inserted on a gynophore ; flowers pedicellate, not conspicuously bracteate ; tendrils present .. .. 7. **Crossostemma**
Flowers unisexual ; corona small and inconspicuous ; tendrils present ; leaves glandular at the base .. .. 8. **Adenia**

1. SOYAUXIA Oliv. in Hook. Ic. Pl. t. 1393 (1882).

Inflorescence very dense-flowered, continuous, 10–12 cm. long ; branchlets very minutely pubescent, at length glabrous ; leaves elongate-oblong, gradually acutely acuminate, rounded or subacute at the base, up to 30 cm. long and 8 cm. broad, entire, closely reticulate, glabrous ; lateral nerves about 15 pairs ; sepals rusty-tomentellous ; valves of fruit broadly ovate, leathery, smooth, 3 cm. long, 2·5 cm. broad .. .. 1. *grandifolia*
Inflorescence with scattered flowers, not continuous :
Stipules persistent during the time of flowering ; branches pilose ; leaves oblong-lanceolate, very acutely acuminate, subobtuse at the base, 8–13 cm. long, 2–4 cm. broad, entire, closely reticulate, thinly pilose only on the midrib ; lateral nerves 10–12 pairs ; inflorescence rusty-pubescent, 5–8 cm. long ; fruits scarcely exceeding the persistent calyx, hairy at the tip .. .. 2. *velutina*

Stipules deciduous before flowering; branches very shortly pubescent; midrib not pilose below:

Leaves glabrous below, oblong to elliptic, gradually acuminate, rounded at the base, 12–18 cm. long, 4–6 cm. broad; lateral nerves 13–15 pairs; sepals glabrous towards the margin; fruits oblong, nearly 2 cm. long, shining, surrounded by the thickened persistent glabrescent calyx; seeds 3-sided, black, nearly 1·5 cm. long ..... 3. *floribunda*

Leaves pubescent on the nerves below, obovate-oblong or elliptic, acuminate, subacute at the base, 12–23 cm. long, 4–7·5 cm. broad; lateral nerves about 12–15 pairs; tertiary nerves parallel, conspicuous:

Sepals glabrous towards the margins; fruits not seen .. .. 4. *bipindensis*

Sepals densely appressed-tomentose all over .. .. .. 5. *Talbotii*

1. **Soyauxia grandifolia** *Gilg & Stapf* in Journ. Linn. Soc. 37 : 102 (1905)—Stapf 606. A shrub, with velvety spikes of small white flowers; stamens with very small anthers as in the other species.
Liberia: Grand Bassa! Sinoe Basin! Exsicc.—*White. Dinklage* 2051.

2. **S. velutina** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *S. laxiflora* A. Chev. Bot. 288, not of Gilg. A shrub, growing by water, sometimes climbing.
Ivory Coast: Bingerville, etc.! Guidéko (May)! S. Nigeria: Atigere (Feb.)! Exsicc.—*Millen* 147. *Chev.* 15444; 16427; 16452.

FIG. 73.—SOYAUXIA FLORIBUNDA *Hutch.* (PASSIFLORACEAE).

A, flower, enlarged. B, stamens, front and back, showing peltate 4-celled anther. C, flower with petals and stamens removed, showing corona and free styles. D, vertical section of ovary. E, cross-section of ovary. F, fruiting axis after fruits have fallen away. G, fruit, showing dehiscence by 3 valves. H, seed.

3. **S. floribunda** *Hutch.* in Kew Bull. 1915 : 44. *S. gabonensis* A. Chev. Bot. 288, not of Oliv. A shrub, up to 12 ft.
Gambia! Sierra Leone: Bunjema (June)! Kennema (fr. Jan.)! Matotoka (July)! Mayoso (Aug.)! Yonibana (fr. Nov.)! Ronietta (fr. Nov.)! Liberia: ? locality! Ivory Coast: Guidéko (May!) Exsicc. —*Garrett. Thomas* 4842; 5385; 5645; 7601; 7735; 7950. *Aylmer* 86. *Chev.* 16452. *Cook* 107.

4. **S. bipindensis** *Gilg* ex *Bak. f.* in Journ. Bot. 1914 : 4, name only. A tree.
S. Nigeria: Ogabi, Obudu district, 800 ft. (June)! Oban! Also in Cameroons. Exsicc.—*Unwin* 5. *Talb.* 1614. (See Appendix).

5. **S. Talbotii** *Bak. f.* l.c. A shrub, 15–18 ft. Like the preceding, "but the flowers are slightly larger and the lateral nerves of the leaves are more distant."
S. Nigeria: Eket, Ikotobo Road! Exsicc.—*Talb.* 3254.

2. PASSIFLORA Linn.—Benth. & Hook. f. Gen. Pl. 1 : 810.

A slender twiner with softly hispid branches; leaves digitately trilobed, widely cordate at the base, acute at the apex of the lobes, 5–10 cm. long and broad, thin, ciliate; tendrils axillary, not branched; flowers axillary, solitary, about 5 cm. in diam.; pedicel usually a little longer than the often ciliate petiole; bracts pinnatisect, with numerous gland-tipped cilia, about 2 cm. long, at length larger in fruit; petals white; corona multistriate, bluish-purple; fruit ovoid, up to 4 cm. long, glabrous, surrounded by the persistent calyx .. .. *foetida*

P. foetida *Linn.*—Stapf 606; Holl. 3 : 326; Chev. Bot. 284. Rank-scented; fruit edible.
A native of tropical America, naturalised in waste places. (See Appendix).

3. SMEATHMANNIA Soland.—F.T.A. 2 : 506.

Leaves rounded at the base ; glands on the branchlets often stalked :
Branches more or less tomentose ; leaves pubescent below, broadly elliptic to obovate, rounded to a shortly acuminate apex, 6–20 cm., but usually about 8 cm. long, 4–7 cm. broad, undulately glandular-toothed ; ovary densely villous .. .. 1. *pubescens*
Branches almost glabrous ; leaves glabrous, oblong-elliptic, shortly acuminate, 7–15 cm. long, 4–6 cm. broad, glandular-serrulate ; ovary glabrous
2. *laevigata* var. *nigerica*
Leaves cuneate at the base ; ovary glabrous ; branches and leaves glabrous or nearly so, the latter very acutely acuminate, 7–12 cm. long, 3–5 cm. broad, rather shining ; glands on the branchlets sessile .. .. 2. *laevigata*

1. **S. pubescens** *Soland.*—F.T.A. 2 : 506 ; Stapf 606 ; Chev. Bot. 285, incl. vars. *cordifolia* and *parviflora* A. Chev. *S. rosea* and *S. emarginata*, both of Lemaire. A shrub or small tree, 15 ft. or more high ; flowers white, fragrant ; fruits white or reddish, crustaceous, not longer than the calyx.
Fairly common from French Guinea to S. Nigeria. Also in Cameroons and Ubangi-Shari-Chad. Exsicc. —*T. Vogel* 5 ; 58. *Mann* 835 ; 867. *Sc. Elliot* 4387a ; 4799. *Barter* 201. *Talb.* 3615. *Cook* 117. (See Appendix).

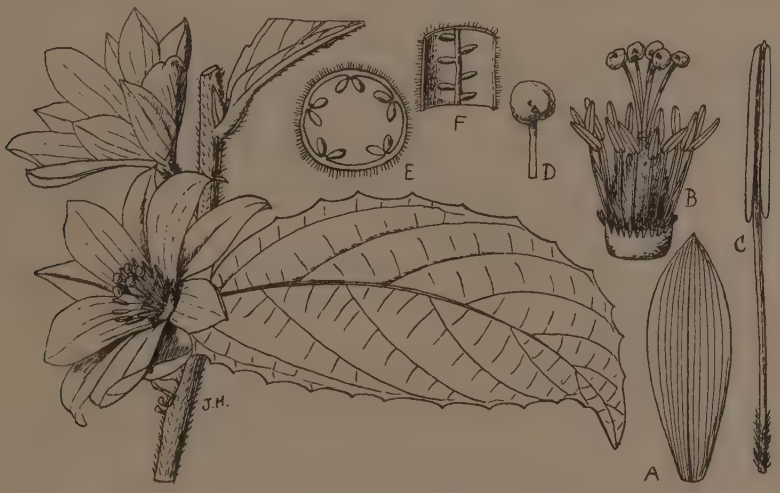

FIG. 74.—SMEATHMANNIA PUBESCENS *Soland.* (PASSIFLORACEAE).

A, petal. B, stamens and pistil, with surrounding corona. C, stamen. D, stigma. E, cross-section of ovary. F, part of ovary from within showing parietal placenta and ovules. Partly after Bot. Mag.

2. **S. laevigata** *Soland.*—F.T.A. 2 : 507 ; Stapf 606 ; Chev. Bot. 284. A shrub or small tree ; flowers smaller than in the preceding ; fruits exceeding the calyx.
French Guinea : Rio Nunez ! Konakry (Feb.) ; Kindia (Mar.) ; Timbo and Upper Niger (April). Sierra Leone : Freetown (Jan.) ! Regent (Dec.) ! Scarcies R. (Jan.) ! Bagroo R. (Mar.) ! Falaba-Pujehun (fl. and fr. Feb.) ! Kennema (Mar.) ! Sherboro ! Magbile (Dec.) ! Liberia : Monrovia ! ? locality ! Exsicc.—*T. Vogel* 149. *Mann* 791. *Sc. Elliot* 3912 ; 4414 ; 4696 ; 5829. *Thomas* 5876. *Cook* 24 ; 62 ; 70. (See Appendix).
Var. **nigerica** *A. Chev.* Bot. 285. A shrub or tree, up to about 30 ft. high ; flowers white ; fruit ivory-white.
French Sudan : Sangarala (Feb.) ! Senegal : Sedhiou (Feb.). French Guinea : Kankan (Mar.) ; Kouroussa ! Sierra Leone : Kennema (June) ! Exsicc.— *Aylmer* 87. *Chev.* 345 ; 568 ; 2999 ; 15713 *Pobéguin* 222.
It seems very probable that this variety is only one of the results of hybridisation between the two species, as suggested from a study of numerous specimens collected in Sierra Leone by *Thomas* (Nos. 7098 and 7022). Another combination of characters is also shown by *Thomas's* specimens (Nos. 5064, etc.), which have the narrow-based leaves of typical *S. laevigata* and the villous ovary of *S. pubescens*.

4. PAROPSIA Noronha—F.T.A. 2 : 505.

Shrub ? branches rusty-pubescent ; leaves oblong-elliptic, rounded or slightly cuneate at the base, acuminate, 8–14 cm. long, 3·5–5 cm. broad, repand-dentate, thin, pubescent on the nerves, finely reticulate ; flowers appearing before the leaves ? fasciculate on long inflorescences ; pedicels densely pilose, about 8 mm. long ; sepals spathulate-oblanceolate, subobtuse, about 1 cm. long ; petals slightly longer than the sepals, glabrous .. .. *guineensis*

P. guineensis *Oliv.*—F.T.A. 2 : 505.
8. Nigeria : Calabar ! Exsicc.—*Thomson* 31.

5. ANDROSIPHONIA Stapf in Journ. Linn. Soc. 37 : 101 (1905).

A shrub ; leaves oblong-elliptic, acuminate, subacute and often with two large black glands on each side at the base, 12–25 cm. long, 4–7 cm. broad, denticulate, slightly puberulous when young, distinctly reticulate on both surfaces ; lateral nerves about 6–8 pairs ; flowers greyish-green in a terminal panicle ; bracts leafy, conspicuously glandular ; sepals tomentellous ; petals about the same length *adenostegia*

A. adenostegia *Stapf* l.c.—Stapf 606 ; Chev. Bot. 288. Shrub 4–5 ft. high ; fruits yellow.
Sierra Leone : Guma (Jan.) ! Liberia : Monrovia ! Kakatown ! Ivory Coast : Haut-Nuon (April). Exsicc.—*Smythe* 216. *Whyte*.

6. BARTERIA Hook. f.—F.T.A. 2 : 510.

Flowers solitary or up to three in the leaf-axils and inserted approximately at the same level ; branchlets solid except for hollow spindle-shaped swellings here and there ; leaves spirally arranged, oblanceolate to oblong, up to 7 cm. broad, with a narrow petiole ; bracts acute .. .. 1. *nigritiana*

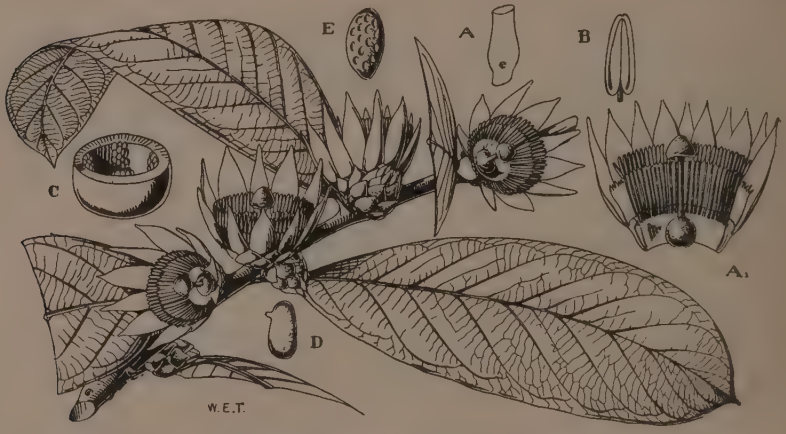

FIG. 75.—BARTERIA NIGRITIANA *Hook. f.* (PASSIFLORACEAE).
A, hollow branchlet with opening made by ants. A1, flower laid open. B, anther. C, cross-section of ovary. D, ovules. E, seed.

Flowers four or more arranged in a line in the axil of the decurrent leaf-blade ; branchlets hollow throughout and cylindrical ; leaves distichous, oblong or slightly obovate-oblong, 10–12 cm. broad, with a very broad petiole ; bracts rounded at the apex 2. *fistulosa*

1. **B. nigritiana** *Hook. f.*—F.T.A. 2 : 510. A tree, 30–40 ft. high ; branchlets with spindle-shaped hollow swellings occupied by ants ; flowers white, sweet-scented, with a large mushroom-shaped yellow stigma ; fruit ovoid, yellowish, with compressed pitted seeds. Chiefly found in the coastal districts.
S. Nigeria : Lagos (Jan.–Mar.) ! Akassa ! Brass ! Bonny (Oct.) ! Calabar ! Agolo ! Also in Cameroons, Spanish Guinea and Gabon. Exsicc.—*Barter* 2119. *Mann* 507. *Thomson* 32. *Thomas* 152. (See Appendix).
2. **B. fistulosa** *Mast.*—F.T.A. 2 : 511. A tree, 20 ft. high ; branches becoming hollow and cylindrical, inhabited by ants.
S. Nigeria : Oban ! Barombi (Feb.) ; Victoria. Fernando Po ! Also in French Cameroons. Exsicc.—*Mann* 268. *Talb.* 471. *Preuss* 31. *Staudt* 959. *Winkler* 1170.

7. CROSSOSTEMMA Planch.—F.T.A. 2 : 511.

Climber ; branchlets glabrous ; leaves oblong-elliptic, obtuse or slightly cuneate at the base, acutely acuminate, 7–11 cm. long, 3–5 cm. broad, strongly reticulate on both surfaces ; lateral nerves much-branched, about 5 pairs ; tendrils axillary with the few-flowered inflorescence ; pedicels jointed in the middle ; flowers yellow ; sepals and petals subequal, closely marked with darker spots, about 1 cm. long ; fruit ellipsoid, acute at each end, 6-sided, about 8 cm. long, valves boat-shaped with the placentas down the middle ; seeds ovate, smooth, about 1 cm. long *laurifolium*

C. laurifolium *Planch.*—F.T.A. 2 : 511 ; Chev. Bot. 285.
French Guinea : Bilima (Dec.) ; foot of Mt. Nzo (Mar.). Sierra Leone : Rotomba Island (Mar.) ! Kambui Hills ! Mamaha (Nov.) ! Ivory Coast : Bouroukrou (Dec.–Jan.) ; Indenié (Mar.) ; Haut-Nuon (April). Gold Coast : Axim ! Exsicc.—*Kirk* 13. *Burton* and *Cameron*. *Lane-Poole* 461. *Thomas* 4381.

8. ADENIA Forsk.—F.T.A. 2 : 512, as *Modecca* Lam. and *Ophiocaulon* Hook. f.

Leaves with a pair of separate glands at the top of the petiole ; sepals united about half-way up :

Peduncles very short, not more than 0·5 cm. long :

Leaves oblong or oblong-elliptic, subacute at the base, acute at the apex, 6–8 cm. long, 2·5–4 cm. broad, entire, laxly reticulate below, glabrous ; petiole biglandular at the top, up to 1·5 cm. long ; male flowers about 2 cm. long 1. *tenuispira*

Leaves widely cordate at the base ; other characters as below .. .. 4. *lobata*

Peduncles longer, over 2 cm. long :

Leaves acute to rounded at the base :

Pedicels articulated about half-way up ; male flowers about 1·5 cm. long ; leaves oblong or ovate-oblong, acutely acuminate, subobtuse at the base, 8–10 cm. long, 3·5–4·5 cm. broad, entire, glabrous, laxly venose ; petiole 1·5–2 cm. long, biglandular at the top .. .. 2. *oblongifolia*

Pedicels articulated nearly at the apex ; male flowers about 1 cm. long ; leaves ovate to ovate-elliptic, rounded at the base, gradually acuminate, 10–13 cm. long, 4–6 cm. broad, entire, glabrous, very laxly venose ; petiole 1·5–2 cm. long, with two large glands at the top .. .. 3. *Mannii*

Leaves widely cordate or truncate at the base, entire or repand-lobate, rarely deeply lobed, ovate, acuminate, 10–15 cm. long, 6–10 cm. broad, thin, glabrous,sub-5-nerved from the base ; stems tuberculate ; petiole half the length of the leaf, with 2 broad semilunar fleshy glands at the top ; male flowers about 1·5–2·5 cm. long ; calyx campanulate, lobes lanceolate, acute ; petals laciniate .. .. 4. *lobata*

Leaves with the glands at the apex of the petiole consolidated and forming a peltate base; sepals united about halfway up :

Inflorescence long-pedunculate ; leaves 3-lobed to beyond the middle, 10–13 cm. long, glabrous, membranous, 5-nerved from the base ; petiole 4–6 cm. long ; peduncle 15 cm. long or more ; male flowers about 2 cm. long ; petals linear 5. *aspidophylla*

Inflorescence sessile ; leaves 3–5-lobed to about the middle, thin, lobes rounded at the apex, glabrous, glaucous, about 5–8 cm. long ; petiole about as long as the leaf, the glands at the apex connate and forming the peltate base ; male flowers shortly pedicellate, 5 cm. long ; female much shorter with linear calyx-lobes ; fruits ellipsoid, 3–4 cm. long, distinctly nerved .. .. 6. *venenata*

Leaves with a single often spathulate gland at the top of the petiole ; sepals free to the base or at most united for one-third their length :

Leaves ovate-oblong, acutely acuminate, much longer than broad, slightly cordate at the base, 5–9 cm. long, 2·5–4·5 cm. broad, glabrous, conspicuously black-spotted on the upper surface ; male sepals free to the base, with small fleshy warts on the outside .. .. 7. *cynanchifolia*

Leaves very broadly ovate, truncate or widely cordate at the base, about as broad or broader than long :

Sepals free to the base ; leaves conspicuously spotted :

Inflorescence several-flowered, with a fairly long peduncle ; leaves more or less rhomboid, averaging about 7 cm. broad, entire or slightly lobed ; capsule 6-angled, ovoid, 2 cm. long ; seeds black, coarsely pitted .. 8. *cissampeloides*

Inflorescence few-flowered and shortly pedunculate ; leaves small, averaging about 4 cm. broad, mostly repand-lobate .. .. 9. *gracilis*

Sepals connate for one-third ; leaves broadly ovate, widely and shallowly cordate, obtusely and shortly acuminate, 6–10 cm. long, 5·5–9 cm. broad, entire, minutely dotted on the upper surface when young, otherwise glabrous .. 10. *Dinklagei*

1. **A. tenuispira** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *Modecca tenuispira* Stapf 606. *M. nigricans* A. Chev. Bot. 287. A dioecious glabrous climber with long fine tendrils and greenish flowers.
Liberia : Sinoe Basin ! ? locality ! Ivory Coast : Bouroukrou (Jan.) ! Aboisso (Mar.) ! Exsicc.—*Whyte. Chev.* 17002 ; 17812. *Cook* 346.

2. **A. oblongifolia** *Harms* in Engl. Bot. Jahrb. 26 : 236. A slender glabrous twiner.
S. Nigeria : Johann-Albrechtshöhe (Feb.). Also in French Cameroons ! Exsicc.—*Staudt* 621.

3. **A. Mannii** *Engl.* Bot. Jahrb. 14 : 375. *Modecca Mannii* Mast.—F.T.A. 2 : 516 ; Chev. Bot. 286. A climbing herb or undershrub.
Ivory Coast : Lower Cavally (Aug.) ; Upper Cavally (April). S. Nigeria : Oban ! Ambas Bay (Feb.) ! Exsicc.—*Mann* 17.

4. **A. lobata** *Engl.* l.c. *Modecca lobata* Jacq.—F.T.A. 2 : 516 ; Chev. Bot. 286. *M. caricifolia* A. Chev. and *M. incisa* A. Chev. Bot. 286. *Kolbia elegans* P. Beauv. Fl. Owar. 2 : 91, t. 120. A tall woody climber, the older stems sometimes an inch in diameter and tubercled ; leaves variable in shape ; flowers greenish-yellow, sweet-scented ; fruits yellow.
Fairly common in forests from Senegal to Nigeria (north to Jebba and the Benue R.). Also in Cameroons, Spanish Guinea, Angola, Princes Isl. and Annabon. Exsicc.—*T. Vogel* 115 ; 140. *Barter* 1308 ; 1661. *Mann* 837. *Thomson* 92. *Sc. Elliot* 4463 ; 5329 ; 5914. *Chev.* 13419 ; 19713. *Cook* 235.

5. **A. aspidophylla** *Harms* in Engl. Bot. Jahrb. 26 : 235. A glabrous climber.
S. Nigeria : Johann-Albrechtshöhe (Mar.). Exsicc.—*Staudt* 884.

6. **A. venenata** *Forsk.* Fl. Aegypt.-Arab. 77 (1775). *Modecca abyssinica* Hochst.—F.T.A. 2 : 514. A subarborescent climber, twining, with glabrous glaucous stems.
N. Nigeria : Yola, near Verre Hills (Feb.) ! Also in Eastern Sudan and Abyssinia. Exsicc.—*Dalz.* 190.

7. **Adenia cynanchifolia** *Harms* in Engl. & Prantl Pflanzenfam., Nachtr. 255. *Ophiocaulon cynanchifolius* Mast.—F.T.A. 2 : 519. A climber, with slender terete branches.
Fernando Po (Nov.) ! Exsicc.—*T. Vogel* 196.

8. **A. cissampeloides** *Harms* l.c. 255. *Ophiocaulon cissampeloides* Mast.—F.T.A. 2 : 518 ; Holl. 2 : 325. *O. tropaeoloides* A. Chev. Bot. 287. *O. Rowlandii* Baker. A climber, with terete ashen branches ; leaves often marbled above, pale below ; petals greenish-yellow ; common in ravines, forest, &c.
Sierra Leone : Freetown ! Falaba (Mar.) ! Talla Hills ! Fundembaia (Oct.) ! French Guinea : Futa Jallon, 3,900–4,000 ft. (April) ! Timbo (May) ! Ivory Coast : several localities ! Gold Coast : Obuasi (Nov.) ! Atuntumbrim (Oct.) ! N. Nigeria : Nupe ! Abinsi ! S. Nigeria : Lagos ! Abeokuta ! Fernando Po (June, Nov.) ! Also in Cameroons, Spanish Guinea and Central Africa. Exsicc.—*T. Vogel* 162. *Barter* 1663. *Sc. Elliot* 4975 ; 5420 ; 5921. *Mann* 413 ; 497. *Thomas* 2873. *Chev.* 12641 ; 12903 ; 13603 ; 15526 ; 16466 ; 17672 ; 19605 ; 19879. (See Appendix).

9. **A. gracilis** *Harms* in Engl. Bot. Jahrb. 26 : 236 (1899). A climber of the same habit as the preceding, with smaller flowers and leaves.
S. Nigeria : Oban ! Also in Cameroons and Gabon. Exsicc.—*Talb.* 469. (See Appendix).

10. **A. Dinklagei** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A climber, with white stems.
Liberia : Grand Bassa ! ? locality ! Exsicc.—*Dinklage* 2109. *Cook* 170.

Imperfectly known Species.

Modecca quercifolia *A. Chev.* Bot. 287. A woody climber.
Ivory Coast : Cavally Basin, Tépos country, between Toula and Nékaougnié ! Exsicc.—*Chev.* 19566.
In the Paris Museum we have seen the type of this. It consists of a small young shoot with deeply pinnately divided leaves and simple tendrils, but without glands on the petiole. It may be a young condition of *A. lobata* or of some species of another genus.

FIG. 76.—ADENIA CISSAMPELOIDES *Harms* (PASSIFLORACEAE).

A, branch with male inflorescence and leaves. B, male flower opened out. C, stamen. D, E, sepal and petal of male flower. F, female inflorescence. G, female flower laid open. H, cross-section of ovary. I, fruit. J, fruit, open.

56. CUCURBITACEAE

Herbs or rarely undershrubs with watery juice, often scabrid ; stems scandent or prostrate ; tendrils mostly present, spirally coiled. Flowers monoecious or dioecious, very rarely hermaphrodite, actinomorphic. Male flower : calyx tubular, lobes imbricate or open ; corolla polypetalous or gamopetalous, lobes imbricate or induplicate-valvate ; stamens free or variously united, mostly 3, rarely 1–5, one anther always 1-celled, the others 2-celled, cells straight or often curved, flexuous or conduplicate, connective often produced. Female flower : calyx-tube adnate to the ovary and often produced beyond it ; staminodes usually not present ; ovary inferior or very rarely free ; placentas often 3, parietal but often meeting in the middle ; ovules numerous, rarely few, arranged towards the walls of the ovary ; style simple or rarely 3 free styles ; stigmas thick. Seeds various, often flattened, without endosperm.

Mainly a tropical family of scandent habit and often with spirally coiled tendrils ; flowers always unisexual ; anthers often twisted ; ovary inferior, with parietal placentas.

Petiole with a pair of glands on each side at the top or on each side of the decurrent leaf-base ; tendrils usually branched :
Ovary 1-celled with intrusive placentas ; glands on the petiole ; petals free :
Dioecious ; male flowers racemose, female solitary ; leaves palmately divided ; petals entire ; fruit globose or ellipsoid, smooth .. .. .. 1. **Adenopus**
Monoecious ; male and female flowers solitary ; leaves not lobed ; petals denticulate ; fruit large, of variable shape .. .. 2. **Lagenaria**
Ovary 3–4-celled with axile placentas ; glands on the decurrent base of the leaf ; fruits very small, ellipsoid ; leaves more or less lobed ; petals united 3. **Cayaponia**

Petiole without glands at the top :
Petals free :
Tendrils not branched ; leaves digitately lobed ; male inflorescence racemose or subfasciculate ; petals linear or filiform ; anthers longitudinally conduplicate ; root tuberous .. .. 4. **Trochomeria**
Tendrils branched ; petals not linear ; male flowers racemose :
Leaves digitately lobed ; petals covered by the calyx in bud ; fruit ellipsoid, smooth when ripe, with a fibrous endocarp containing the seeds .. .. 5. **Luffa**
Leaves not or very slightly lobed ; petals exposed in bud :
Petals large and obovate, much overlapping in bud, nervose ; tendrils branched towards the middle ; leaves coriaceous .. .. 6. **Cogniauxia**
Petals smaller, oblong, striate ; tendrils branched only towards the apex ; leaves thin .. .. 7. **Gerrardanthus**
Petals united in the lower part :
Anthers straight or curved, not flexuous .
Bract foliaceous and fimbriate at the base of the inflorescence in the axils of the leaves, resembling a stipule ; leaves deeply lobed nearly to the base ; tendrils simple ; male flowers few on a common peduncle, female solitary ; fruit small, about 2-seeded .. .. 8. **Blastania**
Bracts minute or absent :
Style inserted on an annular or cup-shaped disk ; anthers often sessile ; fruits often not beaked (not known in *Oreosyce*) :
Connective of anther mostly produced at the apex ; calyx shortly campanulate 9. **Melothria**
Connective not produced ; calyx-tube cylindric ; tendrils simple 10. **Oreosyce**
Style without a disk at the base ; connective of anther produced at the apex ; anthers not sessile ; fruits beaked, small .. .. .. 11. **Kedrostis**
Anther-cells flexuous or conduplicate :
Calyx and pedicels of male flowers broadly winged ; petiole with a large leathery gland within the base ; female sepals linear-spathulate, abruptly reflexed over the top of the fruit .. .. 12. **Dimorphochlamys**
Calyx and pedicels not winged ; gland rarely present within the base of the petiole :
Corolla-segments pectinate ; fruit large, with several very prominent ribs ; seeds large and thick ; leaves divided to the base ; tendrils bifurcate ; flowers dioecious .. .. 13. **Telfairia**
Corolla-segments entire or at most dentate ; fruit not or scarcely ribbed :
Male calyx-lobes pinnatipartite ; fruit very setose with stiff jointed hairs ; leaves slightly lobed ; tendrils undivided ; flowers monoecious, solitary or fascicled ; corolla lobed to about the middle .. 14. **Raphidiocystis**
Male calyx-lobes entire or slightly dentate :
Filaments free or anthers sessile :
Male calyx-tube with 2–3 incurved scales inside ; peduncles often with large foliaceous bracts ; connective not produced at the apex .. 15. **Momordica**
Male calyx-tube without scales inside ; peduncles not bracteate :
Corolla lobed nearly to the base :
Connective of anthers produced at the apex ; anthers on free filaments ; tendrils not forked .. .. 16. **Cucumis**
Connective of anthers not produced :
Tendrils not forked ; flowers monoecious, the males clustered at the apex of a common peduncle, the female solitary in the same axil 17. **Cucumeropsis**
Tendrils forked ; flowers monoecious :
Male calyx-tube short, widely campanulate ; leaves deeply partite 18. **Citrullus**
Male calyx long, funnel-shaped, globose at the base ; leaves divided to about the middle .. .. 19. **Peponium**
Corolla shortly lobed to about or above the middle :
Stamens free ; tendrils simple or branched ; flowers dioecious 20. **Physedra**
Stamens with united anthers ; tendrils branched ; flowers monoecious 21. **Cucurbita**

Filaments united into a column ; tendrils simple (in our species) ; leaves very variable ; male flowers few in fascicles or short racemes, female solitary ; corolla-limb very short .. .. 22. **Coccinia**

1. ADENOPUS Benth.—F.T.A. 2 : 527.

Tendrils unbranched ; leaves glabrous, trilobed or obscurely 5-lobed, more or less truncate at the base, denticulate, 7–10 cm. long, about 7 cm. broad, 3-nerved at the base ; petiolar glands subulate ; male calyx-tube about 4 cm. long, lobes 3 mm. long with hardened glands on the margin ; corolla-lobes broad, trinerved, puberulous outside, female not seen .. .. 1. *longiflorus*

Tendrils bifurcate ; leaves scabrid, mostly distinctly 5-lobed, cordate with a wide sinus and 5-nerved at the base, dentate, up to about 15 cm. in diam. ; petiolar glands capped by a hardened cone with a pore at the tip ; male calyx-tube 2–2·5 cm. long, lobes subulate, nearly 1 cm. long ; corolla-lobes obovate, about 3·5 cm. long, puberulous ; fruits oblong-ellipsoid, about 15 cm. long, green with pale oval blotches .. .. 2. *breviflorus*

1. **A. longiflorus** *Benth.*—F.T.A. 2 : 528 ; Cogn. in DC. Monogr. 3 : 412 ; Chev. Bot. 289. A white-flowered climber.
Sierra Leone ! Ivory Coast : Middle Cavally (July) ; Upper Cavally (May). Exsicc.—*T. Vogel* (no number).

FIG. 77.—ADENOPUS BREVIFLORUS *Benth.* (CUCURBITACEAE).
A, male flower-bud. B, male flower laid open. C, stamens. D, cross-section of fruit.

2. **A. breviflorus** *Benth.*—F.T.A. 2 : 528 ; Cogn. l.c. ; Holl. 2 : 329 ; Chev. Bot. 289. *Lagenaria angolensis* Naud. ; Chev. Bot. 289. *Luffa angolensis* A. Chev. Bot. 291. A perennial, climbing high over trees ; flowers white with dark veins, closed by day.
French Guinea : Ditinn (April) ! Kouria (Aug.) ! Sierra Leone ! Ivory Coast : Middle Cavally (July). Gold Coast : Aburi (July) ! Dahomey : Hollis country (Feb.) ! N. Nigeria : Borgu ! Lemme, 2,600 ft. (May) ! Katsina Allah (Dec.) ! S. Nigeria : Lagos Colony ! Ogun R. ! Aguku ! Also in Cameroons, Gabon, Angola and Eastern Sudan. Exsicc.—*T. Vogel* (no number). *Barter* 710. *Johnson* 127. *Müller* 146 ; 213. *Chev.* 2988 ; 13529 ; 14653 ; 16044 ; 22523 ; 22946 ; 23224. (See Appendix).

2. LAGENARIA Seringe—F.T.A. 2 : 529.

A climbing herb ; branches more or less densely pilose with jointed hairs ; leaves with two small pore-like glands at the base, widely ovate with a broad sinus at the base, up to 20 cm. broad, denticulate, sometimes caudate-acuminate, softly tomentellous below with spicular hairs ; tendrils bifurcate ; male flowers solitary on elongated pedicels ; calyx-tube campanulate, about 1·5 cm. long, pubescent, lobes triangular ; petals white, free, obovate, mucronate, denticulate, about 4 cm. long and 3 cm. broad, pilose within the base ; ovary villous ; fruits very variable in size and shape *vulgaris*

1. **L. vulgaris** *Seringe*—F.T.A. 2 : 529 ; Holl. 2 : 330 ; Chev. Bot. 290.
The Calabash, Bottle-Gourd or White Pumpkin ; cultivated and subspontaneous in the tropics of both hemispheres. (See Appendix).

3. CAYAPONIA Manso—F.T.A. 2 : 568, as *Trianosperma* Mart.

A slender climber, 5–7 m. high ; branches scabrid ; tendrils mostly simple ; leaves triangular-ovate, shallowly 3-lobed, 3-nerved and with a sessile gland on each side

of the decurrent base, shortly dentate, acute, 5–8 cm. long, scabrid ; petiole slender, twining, $\frac{1}{2}$–$\frac{3}{4}$ as long as the leaf ; male flowers axillary, solitary or fasciculate ; fruit shortly stalked, ellipsoid, 1·5 cm. long, pericarp brittle, smooth *latebrosa*

Cayaponia latebrosa *Cogn.* in DC. Monogr. 3 : 776. *Trianosperma africana* Hook. f.—F.T.A. 2 : 568.
Gambia : Albreda. S. Nigeria : Lagos ! Lagos Colony ! Cameroons Mt., 1,000 ft. (Dec.) ! Also in the Canary Islands. Exsicc.—*Mann* 1253. *Rowland. Millen* 60. *Dawodu* 264.

4. TROCHOMERIA Hook. f.—F.T.A. 2 : 524.

Leaves slightly setulose mainly on the nerves below, digitately 5-lobed nearly to the base, lobes acute, coarsely dentate with few teeth ; male flowers few, in very long-stalked racemes ; pedicels slender, elongated, glabrous ; calyx-teeth minute, recurved ; petals filiform, 4–5 cm. long .. .. 1. *macroura*

Leaves rather densely scabrid-setose more or less all over the lower surface, digitately 3–7-lobed almost to the base, lobes linear to narrowly ovate, acute, entire, or rarely the leaves with broad triangular lobes or teeth ; male and female flowers sub-fasciculate ; pedicels comparatively short ; calyx-teeth minute ; petals up to 5 cm. long, broadened towards the base .. .. 2. *Dalzielii*

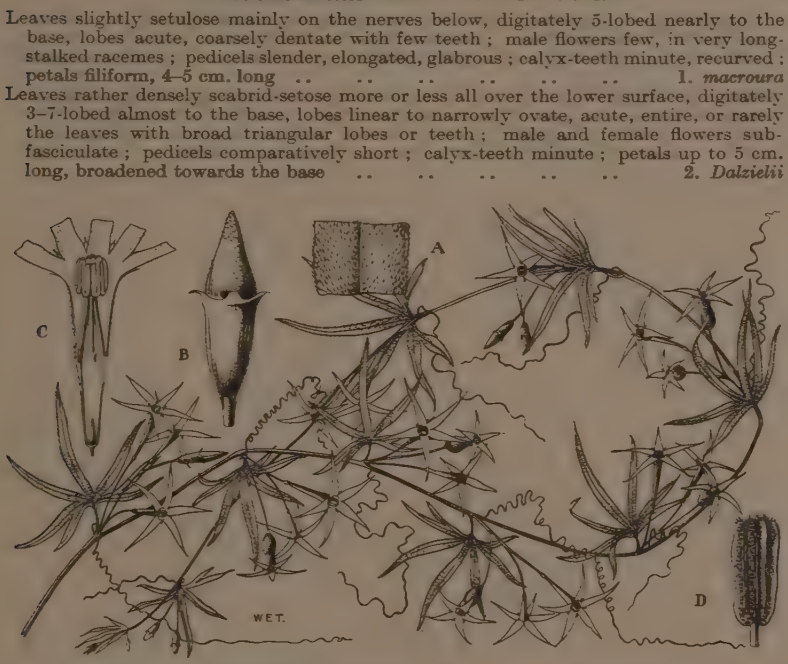

FIG. 78.—TROCHOMERIA DALZIELII *Bak. f.* (CUCURBITACEAE).
A, portion of leaf. B, male flower-bud. C, male flower laid open. D, anther.

1. **T. macroura** *Hook. f.*—F.T.A. 2 : 525 ; Chev. Bot. 289. A climber, "in open country among low trees." French Sudan : Kodjar, Gourma (July). Dahomey : Agouagon (May). N. Nigeria : Nupe ! Also in Ubangi-Shari-Chad. Exsicc.—*Barter* 1524.

2. **T. Dalzielii** *Bak. f.* ex *Hutch.* in Kew Bull. 1927. ined. A climber on grass-stems and low shrubs: arising after grass-fires from a fleshy yam-like root ; flowers green or brownish-tinged.
N. Nigeria : Kontagora (Dec.) ! Kagatum ! Abinsi ! Kyana, Nassarawa Prov. (Feb.) ! Jira (May) ! Exsicc.—*Dalz.* 280 ; 374, 736. *Lely* 126. *Hepburn* 6. (See Appendix).

Imperfectly known Species.

T. atacorensis *A. Chev.* Bot. 288, name only.
French Sudan : Gourma (July) ! Dahomey : Atacora Mts. (June) ! Exsicc.—*Chev.* 14000 ; 24397
Possibly a form of *T. Dalzielii*.

5. LUFFA Cav.—F.T.A. 2 : 530.

Fruits ellipsoid, not ridged ; seeds smooth, narrowly winged ; leaves often deeply digitately lobed, about 7-nerved at the base, scabrid, lobes denticulate ; petiole pubescent .. .. 1. *cylindrica*

Fruits elongated, with up to 10 sharp longitudinal ridges ; seeds rugose, not winged ; leaves more or less as above, but paler and not so deeply lobed .. 2. *acutangula*

1. **L. cylindrica** *Roem.*—Cogn. in DC. Monogr. 3 : 456 ; Stapf 608 ; Chev. Bot. 291. *L. aegyptiaca* Mill.—F.T.A. 2 : 530 ; Holl. 2 : 331 ; Chev. Bot. 291. An annual climber, with yellow flowers.
Common throughout the tropics. The Loofah Gourd. (See Appendix).

2. **L. acutangula** *Roxb.*—F.T.A. 2 : 530 ; Cogn. l.c. 459 ; Holl. 2 : 331. Like the preceding.
Much less common than *L. cylindrica*, and more likely to be met with in the savannah regions. Exsicc.—*Sc. Elliot* 4641.

6. COGNIAUXIA Baill. in Bull. Soc. Linn. Par. 1 : 423 (1884).

A climber; branches puberulous; leaves broadly ovate, deeply cordate, with a wide sinus, acutely acuminate, entire or slightly lobulate-toothed, 15–20 cm. long and broad, thinly coriaceous, very conspicuously and closely reticulate below, with prominent looped nerves; petiole not glandular, 4–6 cm. long; tendrils bifurcate; male flowers corymbose-racemose on long axillary peduncles; bracts linear; calyx-tube narrowed towards the apex, up to 1·5 cm. long, puberulous; sepals short, triangular, with subulate points; petals conspicuous in bud, obovate, mucronate, 3–4 cm. long, entire, nervose, finely puberulous; female flowers not seen
podolaena

C. podolaena *Baill.* in Bull. Soc. Linn. Par. 1: 424. *C. Brazzaei* Cogn. *Luffa Batesii* C.H.Wright. Climbing plant up to 20 ft. long; flowers yellow.
S. Nigeria: Cameroons River (Jan.)! Also in the French Cameroons, Spanish Guinea, Belgian Congo and North Angola. Exsicc.—*Mann* 719.

7. GERRARDANTHUS Harv.—F.T.A. 2 : 519, as *Atheranthera* Mast.

A slender climber, with spirally coiled axillary tendrils; branches glabrous, grooved; leaves ovate-rounded, widely cordate at the base, acutely caudate-acuminate, 9–12 cm. long, 7–9 cm. broad, very thin, entire, not glandular at the base, digitately 5-nerved; petioles up to half as long as the leaves, slender; tendrils exceeding the leaves, very slender; sepals oblong-ovate, rounded at the apex, about 2 mm. long, thin, nervose outside; petals unequal, about 1 cm. long .. .. *nigericus*

G. nigericus *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined.
Gold Coast: Kumasi! S. Nigeria: Oban! Degema! Exsicc.—*Talb.* 1454; 3628. *Cummins* 146.

8. BLASTANIA Kotschy & Peyr.—F.T.A. 2 : 557, as *Ctenolepis* Hook. f.

Slender twiner; stems slightly scabrid, ribbed; leaves digitately 3–5-partite, up to about 7 cm. long, thin, lobes sharply toothed, scabrid-pubescent; petiole pubescent; bract foliaceous and resembling a stipule at the base of the inflorescence, ovate-orbicular, narrowed to the base, fimbriate, about 1 cm. long; male flowers few and very small on a common axillary peduncle up to 2 cm. long, female solitary, subsessile or shortly pedicellate; fruit about 2-seeded, globose, smooth, 1–1·5 cm. in diam. .. .. *fimbristipula*

B. fimbristipula *Kotschy & Peyr.*—Cogn. in DC. Monogr. 3 : 628. *Ctenolepis cerasiformis* Hook. f.—F.T.A. 2 : 558. Flowers creamy-white; fruit scarlet, cherry-like.
Senegal: ? locality! N. Nigeria: Katagum! Extends to Eastern Sudan, Abyssinia, Angola, East and South Africa; also in Arabia and India. Exsicc.—*Farmar* 123. *Dalz.* 118. (See Appendix).

9. MELOTHRIA Linn.—F.T.A. 2 : 562.

Flowers more or less umbellate or racemose on common axillary peduncles:
Leaves truncate at the base, almost entire, acuminate, 5–6 cm. long, membranous, slightly scabrid; petiole slightly pubescent; tendrils simple; pedicels at length elongating and filiform, up to 2·5 cm. long; fruit ellipsoid-globose, about 1 cm. in diam. .. .. 1. *deltoidea*
Leaves truncate at the base, repand-dentate, acutely acuminate, 5–6 cm. long, 3–4 cm. broad at the base, shortly hispid on the nerves below; petiole setulose; tendrils simple; pedicels short; fruit not seen .. .. 2. *Mannii*
Leaves deeply cordate at the base, pentagonal with two short lateral lobes, acutely acuminate, 4–8 cm. long, scabrid; petiole slender, glabrous; tendrils simple, very slender; pedicels short .. .. 3. *minutiflora*
Flowers on simple pedicels in axillary fascicles:
Leaves shortly 5-lobed, pentagonal in outline, widely cordate, mucronate at the apex, 4–6 cm. long, scabrid above, shortly pilose below; petiole shortly pilose, 1–3 cm. long; tendrils simple, slender; flowers rather numerous, shortly pedicellate; fruits reticulate, globose, about 4 mm. long .. .. .. 4. *fernandensis*
Leaves not lobed or at most 3-lobed:
Female flowers sessile or nearly so; stems very scabrid; leaves shortly and subhastately lobed, deeply cordate at the base, subacute at the apex, up to 12 cm. long, denticulate or subentire, mostly very scabrid; fruits subsessile, globose, almost 1 cm. in diam., sparingly setulose .. .. 5. *maderaspatana*
Female flowers on slender pedicels; stems glabrous or nearly so:
Fruits globose; leaves not or hardly lobed, truncate or nearly so at the base
6. *capillacea*
Fruits spindle-shaped, acute; leaves subsagittately lobed .. 7. *tridactyla*

1. **M. deltoidea** *Benth.*—F.T.A. 2 : 563; Cogn. in DC. Monogr. 3 : 594. A slender climber.
S. Nigeria: Abo! Exsicc.—*Barter* 1522.
2. **M. Mannii** *Cogn.* l.c. 617. *Zehneria deltoidea* Hook. f.—F.T.A. 2 : 560, not of Miq. A slender climber, 12–15 ft.
Cameroons Mt., 4,500 ft. (Feb.)! Exsicc.—*Mann* 1277.

3. **Melothria minutiflora** *Cogn.* l.c. 611. *Zehneria micrantha* Hook. f.—F.T.A. 2 : 560, not of F. v. Muell. A very slender climber, 8–10 ft.
Cameroons Mt., 7,000 ft. (Dec.)! Also in French Cameroons. Exsicc.—*Mann* 2010.

4. **M. fernandensis** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A climber, 20 ft.; flowers white, turning yellow.
Fernando Po, 3,000 ft. (Dec.)! Exsicc.—*Mann* 628.

5. **M. maderaspatana** *Cogn.* l.c. 623. *Mukia scabrella* Arn.—F.T.A. 2 : 561; Chev. Bot. 296. A prostrate or scandent annual, scabrid, with small white almost prickly hairs; flowers yellow; berry red.
Found all over the area, and throughout tropical Africa and Asia; also in Australia. (See Appendix).

6. **M. capillacea** *Cogn.* l.c. 600. *M. triangularis* Benth.—F.T.A. 2 : 562. *M. deltoidea* A. Chev. Bot. 296, not of Benth. A very slender climber; tendrils very slender; flowers white; berry reddish when ripe.
Ivory Coast: Nzi Valley (Aug.)! Gold Coast: Kumasi! Togo: Lome! Dahomey: Zagnanado (Feb.)! S. Nigeria: Lagos Colony! Ibo district (Aug.)! Brass! Akassa, R. Nun! Ogun R.! Fernando Po (June, Nov.)! Exsicc.—*T. Vogel* 45; 203. *Barter* 1843; 2130. *Mann* 418. *Chev.* 22236; 22977. *Warnecke* 280.

7. **M. tridactyla** *Hook. f.*—F.T.A. 2 : 562; Cogn. l.c. 596; Chev. Bot. 296. *M. gourmaensis* A. Chev. Bot. 296. A rather slender climber; flowers very small, yellow; fruit nearly glabrous, 1 in. or more long, red when ripe.
French Sudan: Souloula (Mar.). Gourma (July)! Ivory Coast: R. Nzi (Aug.)! Toura country (May). Dahomey: Atacora Mts., 1,200–1,500 ft. (June). N. Nigeria: Katagum (Oct.)! S. Nigeria: Lagos Colony (Sept.)! Extends to Angola, East Africa and Mascarene Islands. Exsicc.—*Dalz.* 127. *Foster* 342. *Chev.* 22276; 24536.

FIG. 79.—TELFAIRIA OCCIDENTALIS *Hook. f.* (CUCURBITACEAE).

A, male flower with corolla removed. B, fruit. C, cross-section of fruit. D, cross-section of seed.

10. OREOSYCE Hook. f.—F.T.A. 2 : 548.

A slender climber, 3–4 m. high; tendrils slender, simple; leaves ovate, rather narrowly cordate at the base, very acute, 5–7 cm. long, slightly lobulate and acutely dentate, setose-scabrid with bulbous-based hairs; petiole slender, often longer than the leaf; flowers monoecious, about 3–4 in the leaf-axils, shortly pedicellate, small; male calyx-tube setulose, 5 mm. long, with subulate lobes 2–3 mm. long; corolla-lobes setulose outside; ovary densely hispid .. .. *africana*

O. africana *Hook. f.*—F.T.A. 2 : 548; Cogn. in DC. Monogr. 3 : 565.
Cameroons Mt., 7,000 ft. (Dec.)! Fernando Po! Exsicc.—*Mann* 2025.

11. KEDROSTIS Medic.—F.T.A. 2 : 563, as *Rhynchocarpa* Schrad.

A slender twiner; stems weakly pilose; leaves ovate or ovate-triangular, deeply cordate at the base, subacute at the apex, up to 10 cm. long and 6 cm. broad, sinuate-dentate, scabrid-pubescent; petiole about ½ as long as the leaf; flowers axillary, the males pedicellate on a short common peduncle, the female solitary and subsessile; fruits about 1·5 cm. long, ovoid-ellipsoid, beaked by the persistent style, long-pilose *foetidissima*

K. foetidissima *Cogn.* in DC. Monogr. 3 : 634. *Rhynchocarpa foetida* Schrad.—F.T.A. 2 : 564; Chev. Bot. 297. A climber, with an unpleasant smell; flowers small, yellowish; fruit scarlet when ripe.
French Sudan: Macina (Sept.)! Senegal: Richard Tol. N. Nigeria: Katagum (Sept.)! Extends to Abyssinia and Somaliland, East and South Africa, and Angola. Exsicc.—*Dalz.* 116; 128. *Chev.* 24824. (See Appendix).

12. DIMORPHOCHLAMYS Hook. f.—F.T.A. 2 : 549.

A slender climber 4–5 m. high ; branches glabrous ; leaves ovate to ovate-orbicular, widely and shortly cordate at the base, acutely acuminate, 10–13 cm. long, denticulate, closely reticulate, scabrid ; petiole with a large leathery gland in the axil, slightly twining, about 1·5 cm. long, becoming verrucose ; male flowers several on a short peduncle ; bracts imbricate ; pedicels short and with broad decurrent wings from the calyx ; calyx-lobes ovate, subacute, about 4 mm. long ; corolla campanulate, tube 1·5 cm. long, lobes ovate, about 1 cm. long ; fruit spherical, about 6–7 cm. in diam., crowned by the reflexed appressed long-spathulate persistent calyx-lobes *Mannii*

D. Mannii *Hook. f.*—F.T.A. 2 : 550 ; Cogn. in DC. Monogr. 3 : 515 ; Chev. Bot. 293.
Ivory Coast : Bingerville ; Bouroukrou (Jan.) ; Haute-Sassandra (May). S. Nigeria : Lagos ! Calabar ! Calabar River (Feb.) ! Ambas Bay ! Fernando Po (Jan., Nov.) ! Also in French Cameroons. Exsicc.—*Mann* 161 ; 2312. *Thomson* 34. *T. Vogel* 61.

13. TELFAIRIA Hook. f.—F.T.A. 2 : 523.

A dioecious climber ; branches puberulous when young ; leaves pedately 3–5-foliolate ; leaflets shortly stalked, obliquely elliptic or ovate, shortly acuminate, up to 15 cm. long and 10 cm. broad, dentate in the upper $\frac{2}{3}$, very slightly scabrid below, 3-nerved from the base ; tendrils bifurcate, spirally coiled above the fork ; male racemes about 15 cm. long, flowering in the upper half ; bracts subrhomboid, petiolate, leafy ; pedicels about 0·5 cm. long ; calyx-lobes tomentellous, crenate ; corolla creamy-white with a red-purple eye ; lobes obovate, about 2 cm. long, pectinate in the upper part, puberulous outside, nervose, glandular inside .. *occidentalis*

T. occidentalis *Hook. f.*—F.T.A. 2 : 524 ; Holl. 2 : 329 ; Chev. Bot. 288. A perennial climber, attaining 100 ft. in length ; fruit about 2 ft. long by 10 in. thick ; seeds over 1 in. across.
Sierra Leone (May) ! Ivory Coast : Indénié (Dec.) ! Dahomey : Zagnanado (Feb.) ! S. Nigeria : Lagos Colony ! Abeokuta (Feb.) ! Calabar (Feb.) ! Fernando Po (Jan.) ! Exsicc.—*Barter* (no number). *Mann* 233. *Thomson* 2324. *Irving* 69. (See Appendix).

14. RAPHIDIOCYSTIS Hook. f.—F.T.A. 2 : 553.

A slender climber, about 2 m. high ; branches glabrous ; leaves more or less pentagonal in outline, deeply cordate at the base, with two short lateral lobes, acutely acuminate, 10–12 cm. long, slightly scabrid ; petioles about $\frac{1}{3}$ as long as the leaves, slender, with golden-brown setae on the upper surface ; male flowers not seen, female 2–3 in the leaf-axils ; sepals pinnatipartite, segments subulate ; ovary densely covered with rich-golden-brown stiff setae ; fruit ellipsoid, about 3 cm. long, densely setose, on short or very long slender peduncles .. .. 1. *Mannii*

As above, but branches pubescent ; leaves not acuminate ; petioles only scabrid ; sepals of male flowers entire ; ovary and fruit as above .. .. .. 2. *Caillei*

1. **R. Mannii** *Hook. f.*—F.T.A. 2 : 554 ; Cogn. in DC. Monogr. 3 : 527. Flowers yellow.
Fernando Po, 2,000 ft. (Dec.) ! Exsicc.—*Mann* 636.

2. **R. Caillei** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *R. Mannii* A. Chev. Bot. 295, not of Hook. f.
French Guinea : Kouria (Aug.) ! Bilima (Sept.) ! Exsicc.—*Caille* in *Herb. Chev.* 15006 ; 15036.

15. MOMORDICA Linn.—F.T.A. 2 : 534.

Leaves 3–5-foliolate ; flowers subtended by a large leafy orbicular toothed bract, the males crowded, the female solitary on long peduncles :

Leaflets elliptic or obovate, often more or less rounded at the base, the lateral ones smaller, the middle up to about 10 cm. long, rather distantly mucronate-dentate, submembranous, glabrous or nearly so ; tendrils simple ; peduncle up to 6 cm. long 1. *cissoides*

Leaflets elliptic-lanceolate, cuneate at the base, the middle one up to 10 cm. long, with long setose teeth on the margin, minutely scabrid ; peduncle up to 12 cm. long .. .. 2. *Cogniauxiana*

Leaves simple, entire, angled or lobed :

Male flowers solitary, with a conspicuous bract on the peduncle :

Bract closely subtending the flower ; leaves lobed up to about the middle, lobes coarsely lobulate-dentate ; fruits becoming smooth with age, warted when young 3. *Balsamina*

Bract below or near the middle of the peduncle ; leaves usually lobed to beyond the middle, lobes more or less sinuate ; fruits muricate when young, at length ridged .. .. 4. *Charantia*

Male flowers several, more or less corymbose or umbellate :

Peduncle with a large orbicular cordate bract at the apex ; branches glandular-puberulous, grooved ; leaves very broadly ovate, shortly and acutely lobate-dentate, about 10 cm. long and 8 cm. broad, widely cordate and with a decurrent base, slightly puberulous below ; tendrils unequally forked ; peduncle 4–5 cm.

long; bract reniform-orbicular, about 2 cm. broad, foliaceous; pedicels about 0·5 cm. long, puberulous .. .. 5. *bracteata*

Peduncle with a small bract (less than 1 cm.) or no bracts:

Male calyx bristly outside towards the base, lobes about 0·5 cm. long; leaves broadly ovate, widely cordate and shortly decurrent at the base, repand-dentate or denticulate, up to 12 cm. long and broad, scabrid-puberulous below; tendrils simple or bifurcate; fruits bristly, beaked .. .. 6. *foetida*

Male calyx not bristly, lobes about 3 mm. broad or less; leaves not more than 10 cm. long:

Leaves very minutely denticulate, scabrid below; peduncles about 2 cm. long; pedicels up to 0·5 cm. long; male flowers numerous, buds about 3 mm. long; fruits not seen .. .. 7. *multiflora*

Leaves repand-dentate, pubescent below on the nerves; peduncles about 5 cm. long with a very small early-deciduous bract at the top; pedicels 1–2 cm. long; male flowers about 3–6, buds about 6 mm. long; fruits densely bristly 8. *Mannii*

Leaves minutely denticulate, scabrid below; peduncles about 4 cm. long, with a fairly large subpersistent bract at the top; male flowers 2–4; pedicels not more than 0·5 cm. long; flower-buds about 6 mm. long; fruits not seen 9. *cordata*

FIG. 80.—MOMORDICA CHARANTIA *Linn.* (CUCURBITACEAE).

A, male flower. B, female flower. C, cross-section of ovary. D, fruit. E, seed. F, G, face and side view of embryo. H, vertical section of seed.

1. **Momordica cissoides** *Planch.*—F.T.A. 2 : 535; Cogn. in DC. Monogr. 3 : 430; Chev. Bot. 290. A tall graceful climber; flowers white, with a large black-purple spot at the base of each petal; fruit 1½ in. long, orange-yellow.
   From French Guinea to Nigeria and Fernando Po; up to over 4,000 ft. in Futa Jallon and the Bauchi Plateau! Also in Angola and Belgian Congo. Exsicc.—*T. Vogel* 33A; 106; 157. *Barter* 1523; 3395. *Mann* 82. *Sc. Elliot* 5896. *Warnecke* 342. *Cook* 192. (See Appendix).
2. **M. Cogniauxiana** *Gilg* in Engl. Bot. Jahrb. 34 : 350. A twining herb, with grooved stem and forked tendrils.
   Cameroons Mt.: Buea! Exsicc.—*Deistel* 486.
3. **M. Balsamina** *Linn.*—F.T.A. 2 : 537; Cogn. l.c. 439; Holl. 2 : 333; Chev. Bot. 290. A climber, wild, and often planted and growing over native huts; flowers yellow (sometimes white) with a dark centre; fruit orange-yellow, beaked, 1–2½ in. long, bursting and exposing red-brown seeds.
   Common in the tropics and subtropics; cultivated in America. (See Appendix).
4. **M. Charantia** *Linn.*—F.T.A. 2 : 537; Cogn. l.c. 436; Stapf 608; Holl. 2 : 333; Chev. Bot. 290. Very like the preceding.
   Common in the tropics; cultivated in India, etc. (See Appendix).
5. **M. bracteata** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A climber.
   S. Nigeria: Eket! Exsicc.—*Talb.* 3133.
6. **M. foetida** *Schum. & Thonn.*—Cogn. l.c. 451. *M. Morkorra* A. Rich.—F.T.A. 2 : 538; Chev. Bot. 291. A climber from a stout perennial root; calyx blackish-green; corolla white, sometimes yellowish; fruit about 3 in. long, yellow or pale orange when ripe, covered with soft prickles, bursting and exposing seeds in a red pulp.
   Ivory Coast: Soubré (June); Baoulé-Nord (July). Gold Coast: ? locality! N. Nigeria: Bauchi Plateau, 3,000–4,600 ft., Vodni (July)! Vom! S. Nigeria: Lagos Colony! Ambas Bay (Feb.)! Fernando Po (Nov., Jan.)! Extends to Angola, Abyssinia, E. Africa and Natal. Exsicc.—*T. Vogel* 33B; 170. *Mann* 170; 766. *Thomas* 1009.
7. **M. multiflora** *Hook. f.*—F.T.A. 2 : 540; Cogn. l.c. 449. A slender climber; flowers yellow.
   Fernando Po (Nov.)! Also in Gabon. Exsicc.—*Vogel* 173.

8. **Momordica Mannii** *Hook. f.*—F.T.A. 2 : 539 ; Cogn. l.c. 451. A slender climber, quite glabrous ; flowers yellow.
Fernando Po, 5,000 ft. (Dec.) ! Exsicc.—*Mann* 627.
9. **M. cordata** *Cogn.* in Engl. Bot. Jahrb. 21 : 208. A glabrous slender climber with ovate-cordate leaves.
S. Nigeria : Victoria (Mar.) ! Exsicc.—*Preuss* 1203.

16. CUCUMIS Linn.—F.T.A. 2 : 542.

Stems and branches setose with long stiff jointed bristles ; leaves not or rarely divided beyond the middle :
Fruits smooth or at most green-lined or hairy ; a ground-trailer ; leaves broadly ovate, widely cordate at the base, 5-lobed to about ⅓ their length or hardly lobed, denticulate, up to about 10 cm. long, scabrid ; petiole nearly as long as the leaf ; flowers monoecious, the male few in the leaf-axils, the female solitary ; young fruits villous .. .. 1. *Melo* var. *agrestis*
Fruits echinate or tuberculate :
Fruits with very numerous dense slender bristles ; leaves rounded, obscurely toothed or the lobes subentire, scabrid ; fruit broadly ovoid, 10–12 cm. long, stalk not more than about 1 cm. long .. .. 2. *dipsaceus*
Fruits with fewer stout scattered tubercles ; leaves acute, sharply dentate, bristly-setose on both surfaces ; fruit 10–12 cm. long, stalk 4–5 cm. long 3. *metuliferus*
Stems and branches more or less shortly scabrid ; leaves often divided below the middle :
Fruits with stout short tubercles, oblong-ellipsoid, 6–8 cm. long ; leaves thick, rarely divided beyond the middle, the lobes not again divided, canous, very harshly scabrid .. .. 4. *pustulatus*
Fruits with rather slender or short soft bristles ; leaves divided nearly to the base, the lobes often lobulate :
Plants green, laxly scabrid ; fruits with long slender bristles, oblong-ellipsoid, about 4 cm. long .. .. 5. *ficifolius*
Plants canescent, densely scabrid ; fruits with very short bristles, usually more or less globose, 3–4 cm. long .. .. 6. *prophetarum*

1. **C. Melo** *Linn.* var. **agrestis** *Naud.*—F.T.A. 2 : 546 ; Cogn. in DC. Monogr. 3 : 483 ; Holl. 2 : 334 ; Chev. Bot. 292. Fruit globose or obovoid, longitudinally striped with green.
French Sudan : Djenne (Sept.) ! Dahomey (April) ! Kotonu (Jan., April). N. Nigeria : Borgu ! Sokoto ! Katagum (Sept.) ! S. Nigeria : Obu ! Exsicc.—*Barter* 748. *Dalz.* 117 ; 349. *Debeaux* 191. *Thomas* 575. (See Appendix).
2. **C. dipsaceus** *Ehrenb.*—F.T.A. 2 : 543 ; Cogn. l.c. 500 ; Chev. Bot. 292. A slender annual climber, with pale-green stem.
Gambia ! Ivory Coast : Bingerville. Extends to Eastern Sudan, Abyssinia, Arabia, East Africa, and Angola. Exsicc.—*Ingram*. *Chev.* 15241.
3. **C. metuliferus** *E. Mey.*—F.T.A. 2 : 543 ; Cogn. l.c. 499 ; Holl. 2 : 335 ; Chev. Bot. 292. A yellow-flowered annual climber, with foliage like that of the cucumber ; fruit pendulous, scarlet when ripe, with stout spines.
French Guinea : Futa Jallon, 2,700 ft. (Sept.). N. Nigeria : Borgu ! Lokoja (Oct.) ! Katagum (Oct.) ! Extends to Angola, Abyssinia, East and South Africa. Exsicc.—*Barter* 1527. *Dalz.* 125. (See Appendix).
4. **C. pustulatus** *Hook. f.*—F.T.A. 2 : 544 ; Cogn. l.c. 485 ; Chev. Bot. 293. A ground-trailer from a perennial base ; flowers yellow ; fruit uniform grey-green in colour.
French Sudan : Gourma (July) ! N. Nigeria : Kuka (Jan.) ! Katagum (Oct.) ! Extends to Eastern Sudan, Abyssinia and Somaliland. Exsicc.—*E. Vogel* 40. *Dalz.* 129. (See Appendix).
5. **C. ficifolius** *A. Rich.*—F.T.A. 2 : 543, as *C. Figarei* Del. ; Cogn. l.c. 493. A ground-trailer from a perennial base ; flowers yellow.
Senegal : Cape Verde. N. Nigeria : Sokoto ! Extends to Eastern Sudan, Abyssinia and Arabia, Exsicc.—*Dalz.* 348.
6. **C. prophetarum** *Linn.*—F.T.A. 2 : 545 ; Cogn. l.c. 495 ; Holl. 2 : 335 ; Chev. Bot. 292. A ground-trailer from a perennial base ; flowers yellow ; fruit somewhat resembling a gooseberry, with longitudinal coloured stripes.
French Sudan : Timbuktu (Sept.) ! N. Nigeria : Katagum (July) ! Extends to Abyssinia, Somaliland, Arabia and India, also to Angola and East Africa. Exsicc.—*Dalz.* 123. *Chev.* 1252. (See Appendix).

17. CUCUMEROPSIS Naud.—F.T.A. 2 : 533, incl. *Cladosicyos* Hook. f.

Leaves smooth or nearly so on the lower surface, with a broad sinus and distant lobes at the base, 3–5-angled or more or less lobed, up to 15 cm. long and broad, acute, remotely denticulate ; male flowers umbellate on a distinct long peduncle ; fruit about 30 cm. long, 10 cm. in diam. .. .. 1. *edulis*
Leaves scabrid, thicker, with very narrow sinus and almost contiguous lobes at the base, often shortly lobed, about 12 cm. long, repand-denticulate ; male flowers capitate on a rather short peduncle 3–4 cm. long ; fruit about 6–8 cm. long 2. *Mannii*

1. **C. edulis** *Cogn.* in DC. Monogr. 3 : 518. *C. Mannii* A. Chev. Bot. 293, not of Naud. *Cladosicyos edulis* Hook. f.—F.T.A. 2 : 534. *Momordica procera* A. Chev. Bot. 291, name only. A strong climber ; flowers yellow ; fruit smooth, edible.
Sierra Leone. Ivory Coast : Bouaké (July) ! Bouroukrou (Jan.) ! Agboville (Nov.) ! Tébo (July) ! Dahomey : Abomey. N. Nigeria : Abinsi ! S. Nigeria : Abo ! Lagos Colony ! Aguku ! Also in Cameroons, Belgian Congo, Spanish Guinea and Angola. Exsicc.—*Barter* 483, 1752. *Dawodu* 307. *Johnson* (no number). *Dalz.* 738. *Thomas* 672. *Chev.* 16795 ; 19424 ; 22123 ; 22387. (See Appendix).
2. **C. Mannii** *Naud.*—F.T.A. 2 : 534 ; Cogn. l.c. 517. Like the preceding.
S. Nigeria : Calabar ! Exsicc.—*Mann* (Hort. Paris). (See Appendix).

18. CITRULLUS Forsk.—F.T.A. 2 : 548.

Stems villous with soft woolly hairs; leaves thin, glabrous or pilose, at most only slightly scabrid, more or less triangular in outline, pinnately partite, denticulate, usually about 15 cm. long .. .. 1. *vulgaris*

Stems scabrid with short hairs; leaves thicker, roughly scabrid, more or less ovate in outline, deeply and variously divided, about 10 cm. long or less .. 2. *Colocynthis*

1. **C. vulgaris** *Schrad.*—F.T.A. 2 : 549; Cogn. in DC. Monogr. 3 : 509; Holl. 2 : 336; Chev. Bot. 293. The Water Melon.
Spontaneous and also cultivated throughout tropical Africa. (See Appendix).

2. **C. Colocynthis** *Schrad.*—F.T.A. 2 : 548; Cogn. l.c. 510; Chev. Bot. 293.
Mauritania: Adrar. French Sudan: Timbuktu (July); Ras-el-Ma (Aug.), Lac Faguibine (Aug.). Cultivated in the Mediterranean region, and parts of tropical Africa and Western Asia. Exsicc.—*Chev.* 1253; 2978; 2979.

19. PEPONIUM Engl. in Engl. & Prantl Pflanzenfam., Nachtr. 318—F.T.A. 2 : 526, as *Peponia* Naud.

A monoecious climber; branches villous with jointed many-celled hairs; leaves digitately 5-lobed to about the middle, 5–10 cm. in diam., widely cordate at the base, pilose on both surfaces, lobes ovate, sharply dentate; petiole 1·5–2 cm. long, pilose; tendrils bifurcate, coiled above the fork; male peduncles 1–3-flowered, with conspicuous obovate bracts; calyx-lobes subulate, about 1 cm. long; corolla gamopetalous, deeply lobed, puberulous on both sides, lobes ovate-oblong, up to 3 cm. long, acute, entire, nervose; fruits ellipsoid, 7–8 cm. long, about 5 cm. thick, at length almost glabrous .. .. *Vogelii*

P. Vogelii *Engl.* l.c. *Peponia Vogelii* Hook. f.—F.T.A. 2 : 526; Cogn. in DC. Monogr. 3 : 406; Chev. Bot. 289. Flowers white or pale sulphur-yellow.
Dahomey: Abomey (Feb.). S. Nigeria: Lagos! Fernando Po (Oct.)! Exsicc.—*T. Vogel* 8. *Barter* 2169.

20. PHYSEDRA Hook. f.—F.T.A. 2 : 552.

Petioles pilose with long jointed hairs; stems soon becoming glabrous; leaves digitately 6–7-lobed almost to the base, lobes more or less lanceolate, acutely acuminate, slightly toothed, the middle ones up to 10 cm. long, pilose on the nerves beneath; tendrils simple; flowers yellow, about 10 cm. in diam., the male racemose on axillary peduncles, the female solitary, smaller than the male; calyx-lobes subulate, about 4 mm. long; corolla gamopetalous, 5-lobed, nervose, lobes ovate, acute; fruit spherical, about 5 cm. across, bright red, with yellow spots .. 1. *eglandulosa*

Petioles glabrous or very shortly and sparingly puberulous:

Male flowers very shortly pedicellate; leaves digitately 3–5-lobed to about the middle, about 12–15 cm. in diam., with a wide sinus at the base, lobes at most shortly acute; tendrils branched, branches very unequal .. .. 2. *Barteri*

Male flowers on slender pedicels up to 2 cm. long; leaves digitately 3–5-lobed to well beyond the middle or rarely a few quite entire, about 12 cm. in diam., the basal lobes almost contiguous, lobes long-tailed-acuminate; tendrils simple; fruit red 3. *longipes*

1. **P. eglandulosa** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *Adenopus eglandulosus* Hook. f. *Physedra elegans* Harms & Gilg, partly, as to male specimens. *P. macrantha* Gilg. *P. djalonis*, *P. ivorensis*, *P. sylvatica*, *Cephalandra ivorensis*, *C. sylvatica*, all of A. Chev. Bot. 294–5. A climber, up to 20 ft. or so, with yellow flowers.
French Sudan: near Timbuktu! French Guinea: Kouria (July)! Sierra Leone: Kennema! Port Lokko (Sept.)! Liberia: Fishtown (Oct.)! ? locality! Ivory Coast: various localities! Gold Coast: Akwapim (Dec.)! Togo! N. Nigeria: ? locality! S. Nigeria: near Lagos! Exsicc.—*Morson. Mrs. Addison. Johnson* 514. *Yates* 40. *Moloney. Chev.* 14942; 16063; 16433; 21548; 22235; 22610; 22673. *Dinklage* 1846. *Baumann* 495. *Gironcourt* 39. *Cook* 120.

2. **P. Barteri** *Cogn.* in DC. Monogr. 3 : 525. *Staphylosyce Barteri* Hook. f.—F.T.A. 2 : 555. *Physedra elegans* Harms & Gilg, partly, as to female specimen. *P. heterophylla* A. Chev. Bot. 294, partly, not of Hook. f. A climber, 15–20 ft.; flowers yellow.
Sierra Leone: Falaba (Mar.)! Ivory Coast: Toura country (May)! Indenié (Dec.)! Togo! N. Nigeria: Nupe! S. Nigeria: ? locality! Oban! Fernando Po! Also in Cameroons and Upper Congo. Exsicc.—*Barter* 1525. *Mann* 199; 1166. *Sc. Elliot* 5182; 5402. *Talb.* 1419. *Chev.* 21636; 22628 bis. *Buettner* 704.

3. **P. longipes** *Hook. f.*—F.T.A. 2 : 553; Cogn. l.c. 525; Chev. Bot. 294, partly. Habit of the preceding.
Liberia: ? locality. Ivory Coast: Bouroukrou (Jan.)! between Grabo and Taté (Aug.)! Dahomey: Porto Novo (Jan.)! Fernando Po (Nov.)! Also in Cameroons and Gabon. Exsicc.—*T. Vogel* 223. *Chev.* 16996; 19761. *Cook* 195.

21. CUCURBITA Linn.—F.T.A. 2 : 555.

Leaves distinctly lobed; petioles and nerves of the leaves below clothed with rigid setae; calyx-tube distinct, with linear not foliaceous lobes; fruit mostly ellipsoid or obovoid and longer than broad, variously ribbed, smooth or verrucose, mostly with a coloured reticulation outside; seeds with thickened margins .. 1. *Pepo*

Leaves often scarcely lobed; petioles and nerves below at most roughly scabrid; calyx-tube short with linear or linear-lanceolate but not foliaceous lobes; fruit often very large and depressed, globose, grooved; seeds scarcely thickened on the margin 2. *maxima*

1. **Cucurbita Pepo** *Linn.*—F.T.A. 2 : 556 ; Cogn. in DC. Monogr. 3 : 545 ; Holl. 2 : 338. A large prostrate annual, with more or less angular stems ; flowers rich yellow.
Cultivated in all tropical and subtropical countries. The Pumpkin, Vegetable Marrow, etc. (See Appendix).
2. **C. maxima** *Duchesne*—F.T.A. 2 : 555 ; Cogn. l.c. 544 ; Holl. 2 : 338 ; Chev. Bot. 296. Annual, like the preceding, with more or less subterete stems.
Cultivated in all hot countries. Squash Gourd, Melon Pumpkin, etc. (See Appendix).

22. COCCINIA Wight & Arn.—F.T.A. 2 : 550, as *Cephalandra* Schrad.

A slender twiner ; stems angular, dotted ; leaves very variable, pentagonal and shortly lobed to deeply 3–5-lobed, rather thin, lobes distantly denticulate, pustulate-scabrid on both surfaces ; petiole $\frac{1}{8}$–$\frac{1}{2}$ the length of the leaf ; flowers solitary, pedicellate, pedicels of the male about 2 cm. long, of the female a little shorter ; calyx-teeth triangular-subulate ; fruit ellipsoid, about 5 cm. long, glabrous .. *cordifolia*

C. cordifolia *Cogn.* in DC. Monogr. 3 : 529. *C. Moghadd* Aschers.—Cogn. l.c. 531. *Cephalandra indica* Naud. —F.T.A. 2 : 550 ; Holl. 2 : 337 ; Chev. Bot. 295. *C. quinqueloba* A. Chev. Bot. 295, not of Schrad. *Physedra gracilis* A. Chev. Bot. 294, name only. Flowers white or yellowish-cream ; fruit green with white mottling, scarlet when ripe ; young leaves often with reddish glandular tips to the lobes and marginal teeth.
French Sudan : Goundam (Aug.) ; San, Djenne (Sept.) ; Haouré (Aug.). Senegal : Richard Tol. Sierra Leone : Yonibana (Nov.) ! Liberia : ? locality ! Ivory Coast : Guidéko (June) ! N. Nigeria : Lokoja ! Katagum (June, July, Nov.) ! S. Nigeria : Ibadan forest (Dec.) ! Extends to Abyssinia and Zanzibar ; also in Arabia and abundant in India. Exsicc.—*Barter* (no number). *Punch* 46. *Dalz.* 113–14–15. *Thomas* 4979. *Chev.* 1257 ; 2994–5–6 ; 16416 ; 19013. *Cook* 140.

FIG. 81.—COCCINIA CORDIFOLIA *Cogn.* (CUCURBITACEAE).

A, under-surface of leaf. B, female flower in vertical section. C, male flower cut vertically. D, ovary in cross-section. E, fruit.

57. BEGONIACEAE

Herbs or undershrubs, mostly succulent. Leaves alternate, simple, often unequal-sided or oblique ; stipules free, deciduous. Flowers monoecious, actinomorphic or asymmetric, mostly in axillary cymes, showy. Male flower : sepals 2, opposite, rarely 5, valvate ; petals imbricate or absent ; stamens numerous, filaments free or connate, anthers 2-celled, continuous with the filament, opening lengthwise. Female flower : perianth more or less as in the male ; staminodes absent or very small ; ovary inferior, 2–4- (rarely 1-) celled, mostly angled or winged ; styles 2–5, free or connate ; stigmas often twisted, papillose all over ; ovules very numerous, on axile projecting simple or lobed placentas. Fruit a capsule or berry. Seeds minute and very numerous, with reticulate testa, scanty or no endosperm and straight embryo.

A well-marked, mainly tropical family ; herbaceous, mostly epiphytic, with stipulate often oblique leaves, unisexual flowers, inferior ovary and often winged fruit.

BEGONIA Linn.—F.T.A. 2 : 569.

Leaves peltate :
Leaves with large conical bristle-tipped tubercles on the upper surface, obliquely ovate-elliptic, very obtusely acuminate, 7–12 cm. long, 5–7 cm. broad, serrulate and ciliate, with numerous radiating nerves, areolate below ; petiole 4–5 cm. long, densely setose ; bracts broad, pectinate-ciliate ; male pedicels up to 1·5 cm.long ; stamens about 30 .. .. 1. *lacunosa*
Leaves more or less smooth on the upper surface :
Leaves obovate, somewhat narrowed towards the base, doubly crenate ; ovary and fruit not winged :
Leaves not ciliate, subtruncate at the base, oblong-elliptic, 6–13 cm. long, 3–7 cm. broad, prominently nervose below ; female peduncle about 2 cm. long in the young fruit, slender.. .. .. 2. *Schlechteri*
Leaves distinctly ciliate, rounded at the base, broadly elliptic, 12–15 cm. long, 8–10 cm. broad ; female peduncle stout ; bracts persistent, ciliate 3. *laporteifolia*
Leaves ovate or suborbicular, entire or slightly undulate-crenulate on the margin :
Leaves rounded at the apex or very slightly and obtusely acuminate, ovate-orbicular, 4–12 cm. in diam., crenulate and ciliate, with about 9 radiating pubescent nerves ; petiole pubescent with long weak hairs ; fruits winged, cuneate at the base, wings ciliate ; bracts oblong, 4 mm. long .. .. 4. *modica*
Leaves more or less acutely acuminate :
Ovary and fruit not winged, at most angled, up to 5 cm. long ; flowers borne on a long leafless scape ; leaves obliquely ovate, 10–20 cm. long, 4–10 cm. broad, sinuate-denticulate, slightly ciliate towards the tips, radiating nerves about 10 ; male pedicels 2–3 cm. long ; bracts ciliate, persistent .. 5. *scapigera*
Ovary and fruit winged :
Wings of fruit broadest at the top, narrowed only to the base, slightly ciliate ; leaves as in *B. modica* but acuminate ; flowers umbellate ; peduncle about as long as the petiole ; male pedicels slender, up to 2 cm. long . 6. *quadrialata*
Wings of fruit broadest in the middle, narrowed at both ends ; leaves ciliate on the margins, broadly ovate, slightly cordate at the base, 5–10 cm. long, 5–6·5 cm. broad, denticulate ; petiole setose ; male pedicels about 1 cm. long, slightly pilose .. .. 7. *calabarica*
Leaves not peltate :
Leaves digitately 3- or more-lobed :
Leaves mostly regularly 5-lobed, often tinged with purple, lobes acutely acuminate, irregularly serrate, glabrous ; petiole slender, glabrous ; inflorescence shortly cymose, few-flowered ; male pedicels 1–2 cm. long, female short ; sepals purple-veined ; ovary trigonous ; fruit not winged, ellipsoid, 1 cm. long 8. *oxyloba*
Leaves irregularly 2–3-lobed, small, lobes acute, widely denticulate, sparingly hairy on the nerves ; petiole slender, pubescent ; flowers 2–3 together ; male pedicels 1–1·5 cm. long, female flower sessile ; ovary narrowly winged, fusiform, 1 cm. long 9. *prismatocarpa*
Leaves not lobed :
Petiole very short, not more than about 1 cm. long :
Fruits not winged, linear and resembling those of a *Jussiaea* (see fig. 58, p. 145) :
Leaves rather elongate-oblong or lanceolate-linear, entire or rather remotely dentate, softly stellate-tomentellous below :
Ovary densely rusty-tomentose ; leaves about 2·5 cm. broad, dentate ; bracts ovate, about 1·5 cm. long, stellate-pubescent.. .. .. 10. *furfuracea*
Ovary glabrous ; leaves about 1 cm. broad, subentire ; bracts 2–2·5 mm. long, lanceolate-subulate .. .. 11. *rhipsaloides*
Leaves ovate or ovate-lanceolate, slightly toothed or nearly entire :
Leaves rusty-tomentose on the nerves below, about 10 cm. long, acute, the nerves very conspicuous below ; branches remaining pubescent ; stipules lanceolate, about 3 cm. long, stellate-pubescent ; bracts ovate, acute, nearly 1 cm. long, rusty stellate-pubescent ; fruit 5 cm. long, curved, stellate-pubescent 12. *excelsa*
Leaves glabrous or glabrescent below, with rather inconspicuous nerves ; branches soon becoming glabrous :
Bracts large and persistent, acute, pubescent ; leaves acutely acuminate, rounded and unequal-sided at the base, about 7 cm. long ; flowers few, crowded, shortly pedicellate .. .. 13. *oxyanthera*
Bracts small and deciduous :
Leaves acutely long-acuminate, dentate, 6–8 cm. long, 2–3·5 cm. broad ; fruit slender, 4–5 cm. long .. .. 14. *jussiaeicarpa*
Leaves at most acute, undulate on the margin, 4–9 cm. long, 1·5–4 cm. broad ; fruit fusiform, about 2 cm. long, narrowed at both ends .. 15. *sessilanthera*

Fruits winged :
Leaves linear-lanceolate, acutely acuminate, very thin and almost nerveless, 6–10 cm. long, 1–1·5 cm. broad, entire, glabrous ; stipules narrowly lanceolate, very acute, about 1 cm. long, persistent ; male pedicels filiform, about 5 mm. long ; fruits fusiform, about 2 cm. long, narrowed at both ends, with membranous wings .. .. 16. *polygonoides*
Leaves more or less elliptic or obliquely oblanceolate :
Stipules and bracts broad and pectinate-ciliate, persistent :
Petiole less than 0·5 cm. long ; leaves unequal-sided at the base, 7–12 cm. long, 2·5–5 cm. broad, denticulate in the upper half, closely pustulate below 17. *sessilifolia*
Petiole 1·2–1·5 cm. long ; leaves obliquely cordate at the base, 8–13 cm. long, 4–7 cm. broad, slightly dentate, purple-green below .. 18. *gouroana*
Stipules and bracts usually deciduous ; rhachis of inflorescence marked with prominent scars after the fall of the bracts and flowers ; leaves very unequal-sided at the base, acutely acuminate, about 10 cm. long and 5 cm. broad, minutely toothed, glabrous, pinnately nerved ; male flowers soon falling off ; pedicels up to 1 cm. long ; fruit broadly obovate, 2 cm. long, with broad venose wings .. .. 19. *macrocarpa*
Petiole fairly long, well over 1 cm. long :
Leaves more or less equal-sided and not or only slightly cordate at the base :
Leaves cuneate at the base, elongate-oblong to obovate-oblong, long-acute-acuminate, about 16 cm. long and 4 cm. broad (7–9 cm. broad according to Gilg), denticulate, glabrous ; stipules in bud lanceolate, very acutely acuminate, about 2 cm. long ; male pedicels 1 cm. long ; ovary fusiform, not winged 20. *longipetiolata*
Leaves rounded but not subcordate at the base, subentire, broadly elliptic, subacute, 8–15 cm. long, 6–9 cm. broad, finely pustulate below ; stipules lanceolate, about 1·5 cm. long, stellate-tomentose ; flowers in lax cymes ; male pedicels filiform, about 5 mm. long ; ovary linear-fusiform, stellate-puberulous 21. *rubro-marginata*
Leaves subcordate at the base, acutely acuminate, oblong-elliptic, 7–12 cm. long, 3–5 cm. broad, remotely denticulate, densely pustulate and pubescent on the nerves ; stipules narrowly lanceolate, rusty stellate-tomentose ; peduncle very short, few-flowered ; male pedicels up to 3 cm. long, pubescent 22. *epiphytica*
Leaves usually very unequal-sided and mostly cordate at the base :
Leaves with scattered long simple setose hairs on the upper surface :
Leaves rather coarsely and doubly serrate, acutely acuminate, 7–15 cm. long, up to 9 cm. broad, submembranous, glabrous or nearly so below ; petiole with a ring of setose hairs at the top ; fruits with one wing prolonged to about 2 cm. long .. .. 23. *Chevalieri*
Leaves denticulate and setose-ciliate, triangular-acuminate, about 6 cm. long and 5 cm. broad, finely pustulate below ; petiole sparingly pilose ; ovary fusiform, narrowly winged .. .. 24. *Pseudoviola*
Leaves glabrous or nearly so on the upper surface :
Leaves more or less coarsely dentate :
Leaves 2·5–3·5 cm. long, 1·5–2·5 cm. broad, ciliate on the margin :
Petiole hirsute with long white hairs .. .. 9. *prismatocarpa*
Petiole glabrous, winged ; fruits with rather long broad wings 23. *Chevalieri*
Leaves 10–15 cm. long, 4–8 cm. broad ; petioles glabrous except for a membranous fringe at the top .. .. 25. *Quintasii*
Leaves entire or undulate on the margin :
Leaves not cordate, very obliquely ovate, few-nerved, 12–15 cm. long, 6–8 cm. broad ; bracts large and persistent, cupular, obovate, 1·5–2 cm. long ; stipules deciduous, oblong-lanceolate, expanded at the apex, about 2·5 cm. long ; male sepals obovate-orbicular, membranous, about 2·5–3 cm. long ; ovary not winged .. .. 26. *poculifera*
Leaves cordate at the base :
Leaves more or less subequally cordate at the base, broadly ovate-orbicular, sharply caudate-acuminate, up to 18 cm. in diam., about 7-nerved at the base, obscurely toothed, minutely stellate-pubescent on both surfaces ; stipules about 5 cm. long ; bracts and sepals as in preceding species 27. *ampla*
Leaves very unequally cordate at the base ; bracts small or deciduous :
Inflorescence subsessile or very shortly pedunculate :
Stipules persistent ; fruit stout, about 2–3 cm. long, rusty-tomentose, 4-angled .. .. 28. *Mannii*
Stipules persistent ; fruit 3 cm. long, 7–8 mm. broad, glabrous, 3-sided 29. *alepensis*

Stipules deciduous ; ovary slender, about 1 cm. long :
Leaf-margins entire ; blade with a few stellate hairs above ; petioles thick 30. *cavallyensis*
Leaf-margins denticulate ; blade glabrous ; petioles slender 31. *macrostyla*
Inflorescence with a peduncle about 5 cm. long ; leaves obliquely oblong-lanceolate, acutely acuminate, entire or slightly undulate ... 32. *Preussii*

1. **Begonia lacunosa** *Warb.* in Engl. Bot. Jahrb. 22 : 42. A creeping herb ; flowers white, pink at base.
S. Nigeria : Oban ! Barombi ! Exsicc.—*Preuss* 183.
2. **B. Schlechteri** *Gilg* in Engl. Bot. Jahrb. 34 : 93. A low herb, with short stem creeping and ascending, and numerous fibrous roots.
Cameroons : between Mafura and Mundame (Jan.) ! Exsicc.—*Schlechter* 12915.
3. **B. laporteifolia** *Warb.* l.c. 22 : 41. A creeping herb ; flowers white, pink at base.
S. Nigeria : Barombi ! Exsicc.—*Preuss* 563.
4. **B. modica** *Stapf* in Kew Bull. 1908 : 259. On rocks ; flowers yellow, with red markings.
Gold Coast : Ancobra R. (Dec.) ! near Tarkwa (April) ! Exsicc.—*Johnson* 980. *Chipp* 197.
5. **B. scapigera** *Hook. f.*—F.T.A. 2 : 572. Stemless, with a creeping woody rootstock.
S. Nigeria : Rio del Rey ! Cameroons Mt., 4,000 ft. (Dec.) ! Exsicc.—*Mann* 1946. *Johnston* 44.
6. **B. quadrialata** *Warb.* in Engl. Bot. Jahrb. 22 : 43. *B. Whytei* Stapf—Chev. Bot. 299. Stemless, with a creeping rootstock ; on rocks and in damp places ; flowers yellow and red.
French Guinea : foot of Mt. Nzo (Mar.). Liberia : Sinoe Basin ! Ivory Coast : several localities ! S. Nigeria : Barombi (April–June) ! Exsicc.—*Whyte. Preuss* 119 ; 185 ; 186 ; 319. *Chev.* 21126.

FIG. 82.—LEAVES OF BEGONIA (BEGONIACEAE).

A, B. polygonoides *Hook. f.* B, B. macrocarpa *Warb.* C, B. rubro-marginata *Gilg.* D, B. poculifera *Hook. f.* E, B. ampla *Hook. f.* F, B. Mannii *Hook. f.* G, B. oxyloba *Welw.* H, B. Chevalieri *Warb.* I, B. quadrialata *Warb.* J, B. laporteifolia *Warb.*

7. **B. calabarica** *Stapf* in Kew Bull. 1906 : 20. Stem short, prostrate, or almost stemless ; flowers yellow and red.
S. Nigeria : Calabar ! (Hort. Kew.).
8. **B. oxyloba** *Welw.*—F.T.A. 2 : 573 ; Chev. Bot. 298. *B. Conraui* Gilg. *B. sassandrensis* A. Chev. *B. togoensis* Gilg. Erect, 1–2 ft. high, more or less succulent and red-tinged, with a long woody rootstock ; flowers pale pink, with darker veins.
French Guinea : Farana (Jan.) ; Kissi (Feb.). Sierra Leone : Mts. near Freetown, 2,000 ft. (Aug.) ! Ivory Coast : several localities ! Gold Coast : Begoro (Dec.) ! Ashanti, Fwirem (May) ! Togo : Amedzoive (fl. and fr. July) ! Fernando Po, 3,000 ft. (Dec.) ! Cameroons Mt., 4,000 ft. (Feb.) ! Also in French Cameroons and Angola. Exsicc.—*Mann* 562 ; 1274. *Chev.* 20761 ; 21417. *Conrau* 4. *Baumann* 419.
9. **B. prismatocarpa** *Hook.*—F.T.A. 2 : 573. *B. petraea* A. Chev. A slender dwarf plant ; stem branched, creeping and rooting ; flowers yellow or pinkish-white ; an epiphyte on trees, on rocks, etc.
Ivory Coast : Cavally Basin, Grabo, on granite in deep forest (July) !. Fernando Po, 3,000 ft. (Dec.) ! Exsicc.—*Barter* 2047. *Mann* 563. *Chev.* 19596.
10. **B. furfuracea** *Hook. f.*—F.T.A. 2 : 571. Epiphyte, 3 ft. high ; flowers white and red.
Fernando Po, 1,300 ft. Exsicc.—*Mann* 304.
11. **B. rhipsaloides** *A. Chev.* in Bull. Soc. Bot. Fr. 58, Mém. 8d : 174. A slender epiphyte, hanging from trees ; flowers white, with pink tips.
Liberia : ? locality ! Ivory Coast : Upper Cavally, Guerré country (April). Exsicc.—*Chev.* 21183. *Cook* 78.
12. **B. excelsa** *Hook. f.*—F.T.A. 2 : 571. A climbing plant, 8–10 ft. ; branches stout, woody.
Cameroons Mt., 4,000 ft. (Feb.) ! Exsicc.—*Mann* 1275.
13. **B. oxyanthera** *Warb.* in Engl. Bot. Jahrb. 22 : 35. A climbing shrub, reaching 20–30 ft. ; flowers red and white.
Cameroons Mt. : Buea (Mar.) ! Also in French Cameroons. Exsicc.—*Preuss* 867.

14. **Begonia jussiaeicarpa** *Warb.* in Engl. Bot. Jahrb. 22: 33. A branched climber; flowers yellow and white, with red margins.
Cameroons Mt., 4,500 ft. (July)! Exsicc.—*Dusen* 427.

15. **B. sessilanthera** *Warb.* l.c. 34. Epiphyte, scandent, rooting from the nodes.
S. Nigeria: between Victoria and Bimbia (May)! Exsicc.—*Preuss* 1261.

16. **B. polygonoides** *Hook. f.*—F.T.A. 2: 571; Chev. Bot. 298. Stems woody, slender, flexuous.
Ivory Coast: Upper Nuon, Dyola country, on a kola-tree (April). S. Nigeria: Calabar! Oban! Also in French Cameroons. Exsicc.—*Thomson* 74.

17. **B. sessilifolia** *Hook. f.*—F.T.A. 2: 577. Stem slender, simple or branched, 1–2 ft.; flowers white.
Fernando Po, 1,000–2,000 ft. (Nov.)! Also in French Cameroons. Exsicc.—*Mann* 564.

18. **B. gouroana** *A. Chev.* in Bull. Soc. Bot. Fr. 58; Mém. 8d: 176. A perennial, with a more or less woody root; flowers white, with red spots at the base.
French Guinea: Konianké country (Feb.)! Ivory Coast: Upper Cavally, between Oua and Gouro, 2,000 ft., on moist shady ground (April)! Exsicc.—*Chev.* 20817; 21348.

19. **B. macrocarpa** *Warb.* in Engl. Bot. Jahrb. 22: 43. *B. Simii* Stapf. *B. Pseudoimpatiens* Gilg. An erect succulent herb creeping at the base, often purple-tinged; flowers white with red base, or pink to purple.
Liberia: Sinoe Basin! Gold Coast: Tarkwa (Dec.)! S. Nigeria: Barombi (May)! Also in French Cameroons. Exsicc.—*Whyte. Preuss* 200. *Johnson* 981. *Conrau* 5.

20. **B. longipetiolata** *Gilg* in Engl. Bot. Jahrb. 34: 92. On trees; stems rooting at the nodes.
Cameroons Mt.! We have seen only Kalbreyer's specimen No. 155, which has been doubtfully determined by Gilg, but it seems to agree very well with the description of the type from South Cameroons.

21. **B. rubro-marginata** *Gilg* l.c. 95. A woody epiphyte reaching 2–3 ft. in height; flowers light-pink or white with red margins.
Sierra Leone: Makunde (April)! Falaba (April)! Gold Coast: ? locality (Feb.)! Also in N. Cameroons. Exsicc.—*Sc. Elliot* 5721. *Johnson* 129. *Aylmer* 49.

22. **B. epiphytica** *Hook. f.*—F.T.A. 2: 580. Stem slender, rooting at the nodes, 1½ ft. long; on trees; flowers rose.
Fernando Po, 1,000–2,000 ft. (Dec.)! Exsicc.—*Mann* 565.

23. **B. Chevalieri** *Warb.* ex *A. Chev.* in Bull. Soc. Bot. Fr. 58, Mém. 8d: 177. *B. Elliotii* Gilg. *B. rostrata* A. Chev. Bot. 298, not of Welw. An erect annual, 1 ft. or more high at time of flowering; flowers white or pale pink; often in stony ground; flowering July–Aug.
French Sudan: Koulikoro (Oct.)! French Guinea: Ditinn; Konakry, etc. Sierra Leone: Regent (Dec.)! Ivory Coast: Toura country, 2,700–3,000 ft. (May)! Near Gouro (May). Gold Coast: Kwahu! N. Nigeria: Lokoja (Dec.)! Exsicc.—*Sc. Elliot* 3983. *Brown* 779. *Dalz.* 193. *Chev.* 2997; 18537–8; 21399; 21599; 21647.

24. **B. Pseudoviola** *Gilg* in Engl. Bot. Jahrb. 34: 88. An almost stemless herb, in habit not unlike a violet flowers yellow.
Cameroons: between Banti and Babesong, 1,800–2,100 ft. (Nov.)! Exsicc.—*Conrau* 10.

25. **B. Quintasii** *C.DC.* in Bolet. Soc. Brot. 10: 122. Erect plant.
S. Nigeria: Rio del Rey! Also in Angola, St. Thomas and Princes Isl. Exsicc.—*Johnston* (no number).

26. **B. poculifera** *Hook. f.*—F.T.A. 2: 574. An epiphyte with stout climbing stem several feet in length; the cup below the flowers rose-coloured.
Fernando Po, 2,000 ft. (Nov.)! Cameroons Mt., 4,000 ft.! Exsicc.—*Mann* 561; 1276.

27. **B. ampla** *Hook. f.*—F.T.A. 2: 574. An epiphyte, with stout woody stem; flowers white and rose-coloured.
S. Nigeria: Barombi. Cameroons Mt.: Buea. Fernando Po, 1,000–2,000 ft.! Also in Princes Isl., and, according to Warburg, extending to the Lakes District in East Africa. Exsicc.—*Mann* 314.

28. **B. Mannii** *Hook. f.*—F.T.A. 2: 570. An epiphyte, with stout woody branches, 2–3 ft.; flowers red.
S. Nigeria: Calabar (Feb.)! Fernando Po, 1,300 ft.! Also in Cameroons, Spanish Guinea and Princes Isl. Exsicc.—*Thomson* 23. *Mann* 311; 2317.

29. **B. alepensis** *A. Chev.* in Bull. Soc. Bot. Fr. 58, Mém. 8d: 174. An erect branched epiphyte; flowers white or rose; fruits red.
Ivory Coast: Alépé (Feb., Mar.)! River Mé (Feb.)! Grabo, Mt. Copé, 1,000 ft. (July)! Gold Coast: Anyinam (Oct.)! Exsicc.—*Chev.* 17381; 17482; 19721. *Fishlock* 60.

30. **B. cavallyensis** *A. Chev.* l.c. 176. An epiphyte, with stout half-woody stems, 1–1½ ft. high.
French Guinea: Haut-Konkouré Valley. Ivory Coast: Mt. Do, 2,850 ft. (May). Exsicc.—*Chev.* 21422.

31. **B. macrostyla** *Warb.* in Engl. Bot. Jahrb. 22: 37. A climber, rooting at the nodes; flowers pinkish; fruits scarlet.
Gold Coast: Kibbi Hills (Dec.)! Cameroons Mt.: Buea, 2,900 ft. (Sept.)! Exsicc.—*Johnson* 508. *Preuss* 960.

32. **B. Preussii** *Warb.* l.c. 36. Erect, about 2 ft., or climbing shrub.
S. Nigeria: Elephant Lake, Barombi! Exsicc.—*Preuss* 111; 333.

Imperfectly known Species.

B. purpurea *A. Chev.* Bot. 298, name only.
Ivory Coast: between Gouro and Gouékangouiné (May)! Specimen too poor for description. Exsicc.—*Chev.* 21400.

58. CACTACEAE

Succulent herbs and shrubs of diverse habit, often very spiny, and usually with much reduced leaves. Flowers hermaphrodite, actinomorphic, often handsome, but very small in the African species (*Rhipsalis*). Calyx-tube adnate to the ovary and often produced beyond; lobes few to many, or reduced to minute teeth. Petals 6 or more. Stamens numerous, free or adnate to the base of the petals. Ovary inferior, 1-celled, with parietal many- or rarely few-ovuled placentas; stigma usually radiate. Fruit baccate, many-seeded. Seeds mostly without endosperm.

Exclusively an American family except for *Rhipsalis*. Recognised by the habit and epigynous flowers. Besides *Rhipsalis* some species of *Opuntia* are naturalised in the coast regions.

RHIPSALIS Gaertn.—F.T.A. 2 : 581.

Calyx-teeth very short, 3 or more. Petals 6–10, spreading, oblong. Stamens about 20. Ovary inferior, glabrous. Seeds without endosperm.

An epiphytic shrub or on rocks ; branches cylindrical, fleshy, articulated and sometimes rooting at the nodes, dichotomously branched or subverticillate, glabrous ; leaves scale-like, soon falling off ; flowers white, small, sessile ; calyx minute ; berries yellowish-white like mistletoe, with viscous pulp and black shining seeds *Cassytha*

R. Cassytha *Gaertn.*—F.T.A. 2 : 581. *R. guineensis* A. Chev. Bot. 299.
Ivory Coast : various localities ! S. Nigeria : Uregin (July) ! Fernando Po ! (described by Oliver as var. *tenuior* but perhaps scarcely to be distinguished from the type). Widely distributed in the tropics
Exsicc.—*Mann* 1419. *Unwin* 116.

59. OCHNACEAE

Trees or shrubs with watery juice, rarely herbs. Leaves alternate, simple, very rarely pinnate, often with numerous pinnate nerves; stipules present, sometimes laciniate. Flowers hermaphrodite, actinomorphic, mostly racemose or paniculate. Sepals 4–5, rarely 10, free, imbricate or rarely contorted. Petals free, 4–10, subsessile, contorted or imbricate. Stamens few to many, free ; staminodes sometimes present, subulate or petaloid, sometimes connate into a tube ; filaments persistent ; anthers linear, basifixed, opening lengthwise or by terminal pores. Ovary entire to deeply lobed, 1–10-celled ; ovules 1 to many, axile or parietal or attached to the intrusive placentas ; style simple or divided at the apex. Fruiting carpels often becoming quite separate on the enlarged torus and drupaceous, or elongated capsular and septicidal. Seeds 1 to many, with or without endosperm ; embryo usually straight.

Mostly a tropical family, with stipulate leaves usually with prominent numerous lateral nerves ; ovary usually very deeply lobed with a simple style ; fruiting carpels often quite separate on the enlarged torus ; calyx persistent in fruit.

Trees, shrubs or undershrubs, with deciduous or inconspicuous stipules ; fruit drupaceous or a nut :
Sepals not or only slightly enlarged and often red in fruit, the latter drupaceous and deeply lobed on an enlarged torus :
Stamens numerous ; filaments often as long as or longer than the anthers, the latter dehiscing longitudinally or by pore-like slits .. .. 1. **Ochna**
Stamens 10 ; filaments much shorter than the anthers, the latter opening by apical pores .. .. 2. **Ouratea**
Sepals unequally enlarged and wing-like in fruit, the latter nut-like ; stamens numerous ; ovary 1-celled with a basal placenta .. .. .. 3. **Lophira**
Herbs with persistent pectinate stipules ; fruit a 3-valved septicidal capsule ; stamens 5, accompanied by staminodes in two rows, the inner petaloid, the outer filiform ; ovary entire with parietal placentas .. .. 4. **Sauvagesia**

1. OCHNA Schreb.—F.T.A. 1 : 316.

Flowers borne in long racemes, the pedicels occurring either singly or few in small clusters on the main axis ; branched shrubs or trees with the flowers usually accompanied by the leaves :
Flowers borne singly on the main axis of the inflorescence :
Pedicels articulated at the very base or nearly at the base, leaving a very short " peg " on the axis after falling ; style divided at the apex .. 1. *Mannii*
Pedicels articulated considerably above the base, leaving long " pegs " on the axis after falling .. .. 2. *multiflora*
Flowers borne in small clusters on the main axis of the inflorescence :
Inflorescence not more than 5 cm. long ; pedicels articulated at or near the base, leaving a very short " peg " after falling :
Leaves elliptic or oblong-elliptic, rounded or very obtuse at the base, gradually acute at the apex, 8–10 cm. long, 3–4 cm. broad, the teeth bristly on the margin 3. *Barteri*
Leaves oblanceolate, rather abruptly and fairly long-acuminate, narrowed to the base, 5–8 cm. long, 2–3 cm broad, the teeth rather broad and incurved on the margin .. .. 4. *membranacea*

Inflorescence usually well over 5 cm. long ; pedicels articulated considerably above the base, leaving a fairly long " peg " after falling :
Leaves oblanceolate, gradually acute at the apex, 6–12 cm. long, 1·5–3 cm. broad, with bristly teeth on the margin .. .. 5. *elegans*
Leaves elliptic or obovate-elliptic, rather abruptly acuminate, about 11 cm. long and 4–4·5 cm. broad, shortly incurved-toothed on the margin 6. *Smythei*
Flowers borne on extremely short and small lateral branchlets, often appearing before the leaves or the latter borne on separate shoots ; rarely small trees, usually low little-branched undershrubs ; pedicels articulated at the base :
Flowers white ; tree or large shrub .. .. 7. *alba*
Flowers bright yellow :
Leaves rounded or emarginate at the apex ; lateral nerves rather lax :
Sepals about 5 mm. long ; pedicels up to 2 cm. in fruit, the latter 6–7 mm. long, spherical .. .. 8. *Hillii*
Sepals about 1 cm. long ; pedicels up to 3 cm. in fruit, the latter about 1 cm. long, ellipsoid, reticulate .. .. 9. *Schweinfurthiana*
Leaves shortly acuminate, oblanceolate, up to 7 cm. long and 2·5 cm. broad ; lateral nerves very numerous and close, more prominent above than below ; sepals less than 1 cm. long in fruit ; carpels subglobose, 6–7 mm. long .. .. 10. *Afzelii*
Leaves acutely acuminate, elliptic-lanceolate, 12–18 cm. long, 3–6 cm. broad ; lateral nerves not very numerous and rather distant, equally prominent on both surfaces ; sepals 2–3 cm. long in fruit ; carpels ellipsoid, 1 cm. long 11. *kibbiensis*

FIG. 83.—OCHNA HILLII *Hutch.* (OCHNACEAE).

A, flowering branch. B, fruiting branch. C, under-surface of leaf. D, flower. E, ovary with style. F, stamen. G, vertical section of a drupe.

1. **Ochna Mannii** *Van Tiegh.* in Ann. Sci. Nat., Sér. viii, 16 : 385—Chev. Bot. 106. A shrub about 12 ft. high.
Dahomey : Kotonu (Mar.) ! S. Nigeria : Nun River (Sept.) ! Exsicc. *Mann* 490.
2. **O. multiflora** *DC.*—F.T.A. 1 : 317 ; Chev. Bot. 106. *Ochnella rhizomatosa* Van Tiegh. A glabrous shrub or small tree, flowering in mass about Feb.—Mar. ; petals fugacious ; stipules early deciduous ; calyx wine-red in fruit.
French Sudan : Koumantou (April). Gambia ! Sierra Leone : Falaba (Mar.) ! Liberia : Monrovia ! Grand Bassa (April) ! S. Nigeria : Epe (Feb.) ! Lagos (Feb., Mar.) ! Brass (April) ! Oni ! Old Calabar (April) ! Extends to Congo. Exsicc.—*Perrottet. Whyte. Millen* 159. *Holland* 23. *Dalz.* 1036 ; 1260. *Dinklage* 1647. (See Appendix).
3. **O. Barteri** *Van Tiegh.* in Journ. de Bot. 1902 : 122. A shrub, about 6 ft. high.
S. Nigeria : Idah ! Exsicc.—*Barter* 1643.
4. **O. membranacea** *Oliv.*—F.T.A. 1 : 316 ; Chev. Bot. 106. *Ochnella ovalifolia* Van Tiegh. A glabrous shrub, up to 8–9 ft. ; flowers sometimes white ; fruiting calyx " flesh-coloured," remaining long attached.
Sierra Leone : Sugar Loaf Mt. (May) ! Dahomey : Atacora Mts. (June). Also in Ubangi-Shari. Exsicc.—*Barter* (no number).
5. **O. elegans** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *Monelasmum elegans* Van Tiegh. *Ouratea elegans* A. Chev. A shrub, 15–24 ft. high.
Ivory Coast : Upper Cavally, top of Mt. Do, 2,850 ft. (May) ! Togo : Lome ! Atakpame (Nov.) ! Exsicc.—*Chev.* 21426. *Warnecke* 83. *Mildbraed* 7462.
6. **O. Smythei** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A glabrous shrub, or small tree (?).
Sierra Leone : near Heirakokun ! Exsicc.—*Smythe* 124.

7. **Ochna alba** *A. Chev.* Bot. 106. *Ochnella alba* Van Tiegh. *Ochnella tenuis* Van Tiegh. *Ochnella tenuipes* Van Tiegh. *Ochna tenuipes* A. Chev. A shrub or small tree; flowers white.
French Guinea: Bambanatoumba (Mar.)! Kaba, near Kankan (Mar.)! Futa Jallon (Mar., April)! Liberia: Grand Bassa (April). N. Nigeria: Lokoja, Mt. Patti (April)! Bassa (June)! Idah! Also in Ubangi-Shari. Exsicc.—*Barter* 1641. *Elliott* 44; 57; 244. *Chev.* 555; 610; 12647; 12668.
8. **O. Hillii** *Hutch.* in Kew Bull. 1921: 245. A low shrub, of 2–4 ft. or more, with glaucous leaves; usually leafless when in flower.
French Guinea: Sankaran-Kankan (Mar.)! Gold Coast: Northern Terr.; Bole (April)! Dahomey: Atacora Mts., 1,200–1,800 ft. (June)! N. Nigeria: Sokoto (fl. Feb., fr. Mar.)! Kontagora (Jan.)! Zaria (Feb., April)! Jebba! Jos (Mar.)! Vom! Exsicc.—*Barter* 1029; 1111; 3431. *McLeod* 842. *Hill* 2. *Dalz.* 97; 380. *Lely* 845. *Pobéguin* 832. *Chev.* 24023 bis; 24024.
9. **O. Schweinfurthiana** *F. Hoffm.* Beitr. Fl. Cent.-Ost-Afr. 20. *Ochnella aurea, O. capitata, O. Chevalieri, O. ndellensis*, all of Van Tiegh. A shrub, with greyish-white bark.
Gold Coast: Salaga (May)! Togo: Agoniegebirge! S. Nigeria: Lagos Colony (Aug.)! Extends to Eastern Sudan, Nyasaland and Upper Congo. Exsicc.—*Rowland. Krause. Baumann* 473.
10. **O. Afzelii** *R.Br.*—F.T.A. 1: 319. A glabrous shrub or small tree.
Sierra Leone: Sulimania (Mar.)! Togo: Batila! Also in Cameroons, Ubangi-Shari and Eastern Sudan. Exsicc.—*Sc. Elliot* 5350. *Kersting* 611A. (See Appendix).
11. **O. kibbiensis** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A small shrub, with brilliant red calyx in fruit.
Gold Coast: Kibbi Hills (fr. Dec.)! Akim, Adjapoma (Mar.)! Exsicc.—*Johnson* 266. *Evans* 19. *Glover.*

2. OURATEA Aubl.—Gilg in Engl. Bot. Jahrb. 33: 248 (1903); F.T.A. 1: 319, as *Gomphia* Schreb.

Leaves sessile or subsessile, often very large, elongate-oblanceolate or elongate-obovate, gradually narrowed to a cordate or subcordate base (see fig. 84A):
Inflorescence an elongated simple raceme, the pedicels not clustered, the peduncle very long and flattened; leaves up to about 60 cm. long and 10 cm. broad; lateral nerves very numerous, slightly raised on both surfaces .. .. .. 1. *elongata*
Inflorescence compound, or at least the pedicels in clusters on the main axis of the raceme:
Inflorescence an unbranched usually dense raceme with clusters of flowers on the main axis:
Flowers in a short subcorymbose raceme about 6 cm. long; sepals 6 mm. long; leaves up to 33 cm. long and 10 cm. broad, with rather close parallel nerves prominent on both surfaces, very closely serrulate .. .. 2. *Cameronii*
Flowers in an oblong raceme:
Sepals about 6 mm. long; leaves up to about 40 cm. long and 11 cm. broad, rather distantly denticulate, with fairly close lateral nerves running for some distance parallel to the margin .. .. 3. *Mannii*
Sepals about 1 cm. long; leaves up to 45 cm. long and 11 cm. broad, denticulate, lateral nerves as above .. .. 4. *subcordata*
Inflorescence with long lateral branches:
Pedicels articulated considerably above the base, leaving stout "pegs" about 5 mm. long after falling off; fruiting sepals over 1 cm. long .. 5. *amplectens*
Pedicels articulated at the base, leaving extremely short "pegs" after falling off; fruiting sepals about 5 mm. long .. .. 6. *Schoenleiniana*
Leaves mostly distinctly petiolate and obtuse or cuneate, rarely rounded at the base:
Lateral nerves of the leaves not very numerous, rather distant and quite distinct from the tertiary nerves (see fig. 84A, B):
Inflorescence a laxly branched terminal panicle:
Leaves very large, elongate-elliptic, 20–35 cm. long, 5–8 cm. broad, minutely denticulate in the upper half or two-thirds .. .. 7. *calantha*
Leaves smaller, up to 15 cm., rarely 20 cm. or more long:
Leaves conspicuously and rather closely spinulose-serrate from the apex to near the base (see fig. 84B); fruiting carpels distinctly oblong-ellipsoid 8. *flava*
Leaves subentire or rather obscurely or distantly serrulate; fruiting carpels more or less globose or ovoid-globose:
Pedicels usually about 3–4 together in a cluster on the main axis of the raceme; leaves subentire or distantly toothed .. .. 9. *Vogelii*
Pedicels mostly occurring singly on the axis of the inflorescence; leaves closely toothed:
Flowers fairly large; pedicels 0·5–1 cm. long:
Racemes paniculate; flowers hardly 1 cm. long; pedicels articulated almost at the base, leaving a very short "peg" after falling off:
Leaves obtuse or subacute at the apex .. .. .. 10. *reticulata*
Leaves very acutely acuminate at the apex .. .. 11. *Turneras*
Racemes usually subsimple; flowers about 1 cm. long; pedicels articulated well above the base, leaving a fairly long "peg" after falling off 12. *glaberrima*
Flowers very small, probably not more than 0·5 cm. long; racemes branched from the base; pedicels very short, articulated at the base 13. *micrantha*
Inflorescence a terminal rather dense unbranched or very shortly branched raceme:
Leaves obscurely and distantly toothed, the teeth with long setose points, acutely acuminate, 9–12 cm. long, 3–3·5 cm. broad; stipules subpersistent 14. *Morsonii*

Leaves very closely and distinctly toothed, the teeth with short points :
Stipules and bud-scales persistent :
Lateral nerves 8–11 on each side of the midrib, slightly prominent above ; pedicels articulated well above the base .. .. 15. *Oliveriana*
Lateral nerves 12–20 on each side of the midrib ; pedicels articulated at the very base :
Lateral nerves impressed below, very prominent on the upper surface ; inflorescence shorter than the leaves .. .. 16. *congesta*
Lateral nerves equally prominent on both surfaces ; inflorescence long-pedunculate, longer than the leaves .. .. 17. *ambacensis*
Stipules and bud-scales deciduous ; lateral nerves about 10 on each side of the midrib, raised above ; pedicels articulated considerably above the base 18. *coriacea*
Lateral nerves of the leaves very numerous and close, more or less parallel (see fig. 84c) :
Pedicels articulated at the base or almost at the base :
Leaves thin, not more than 3·5 cm. broad, lanceolate-elliptic or slightly obovate :
Petiole 5–6 mm. long ; bracts at the base of the inflorescence deciduous 19. *Barteri*

FIG. 84.—LEAVES OF OURATEA (OCHNACEAE).

A, Ouratea Schoenleiniana *Gilg.*

B, Ouratea flava *Hutch. & J. M. Dalz.*

C, Ouratea myrioneura *Gilg.*

Petiole very short, about 1–2 mm. long ; bracts at the base of the inflorescence persistent :
Pedicels nearly 1·5 cm. long in flower ; leaves linear-lanceolate, gradually acuminate, 10–12 cm. long, up to 2·5 cm. broad .. .. 20. *pauciflora*
Pedicels about 1 cm. long in flower and fruit ; leaves linear-lanceolate, acute but hardly acuminate, up to 8 cm. long and 2·5 cm. broad 21. *acutissima*
Pedicels below 1 cm. long in flower ; leaves oblanceolate-elliptic, rather abruptly acuminate, 7–10 cm. long, 3–3·5 cm. broad .. .. 22. *affinis*
Leaves coriaceous, elongate-obovate, 5·5–7 cm. broad, about 15 cm. long or more ; petiole about 0·5 cm. long ; inflorescence much shorter than the leaves 23. *calophylla*
Pedicels articulated well above the base :
Leaves coriaceous, elongate-obovate, 10–20 cm. long, 5–8 cm. broad :
Inflorescence rather stout, nearly as long as the subtending leaf ; pedicels not more than 1 cm. in fruit .. .. 24. *calophylloides*
Inflorescence very slender, longer than the subtending leaf ; pedicels already over 1 cm. in flower .. .. 25. *stenorrhachis*
Leaves thin, not more than 12 cm. long and 5 cm. broad : inflorescence long-pedunculate, several-flowered ; leaves oblong to oblong-elliptic, 3–4 cm. broad 26. *myrioneura*

1. **Ouratea elongata** *Engl.*—Gilg in Engl. Bot. Jahrb. 33 : 259. *Gomphia elongata* Oliv.—F.T.A. 1 : 321. A shrub or small tree, up to 14 ft. high.
S. Nigeria : Oban ! Fernando Po (Dec.) ! Also in Cameroons and Gabon. Exsicc.—*Mann* 77.
2. **O. Cameronii** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *O. corymbosa* A. Chev. Bot. 107, not of Engl. A low shrub, up to 2 ft. high.
Ivory Coast : various localities ! Gold Coast : Axim ! Exsicc.—*Burton & Cameron. Chev.* 16364 ; 16441 ; 17411 ; 17795 ; 19229.
3. **O. Mannii** *Engl.*—Gilg l.c. 258. *Gomphia Mannii* Oliv.—F.T.A. 1 : 321. A shrub, up to 10 ft. high.
S. Nigeria : Old Calabar ! Fernando Po (Dec.) ! Also in N. Cameroons. Exsicc.—*Mann* 24. *Thomson* 15.
4. **O. subcordata** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *Gomphia subcordata* Stapf 585, fig. 247 *O. Mannii* A. Chev. Bot. 108, not of Engl. A shrub ; racemes up to 6 in. long.
Sierra Leone : near Laoma (Nov.) ! Liberia : Kakatown ! Ivory Coast : in virgin forest between Mid. Sassandra and Mid. Cavally (June) ! Azaguié (Sept.) ! Exsicc.—*Smythe* 89. *Whyte. Chev.* 19209 ; 22278.
5. **O. amplectens** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *Gomphia amplectens* Stapf 585. A shrub ; leaves up to 12 in. long by about 3 in. broad, with an auricled base.
Liberia : Kakatown ! Exsicc.—*Whyte.*
6. **O. Schoenleiniana** *Gilg* l.c. 264—Stapf 586 ; Chev. Bot. 108. A shrub, up to 12 ft. high ; leaves sessile, deeply cordate at the base, up to about 8 in. long by 2–2½ in. broad.
French Guinea : Farana (Jan.) ! Sierra Leone : Bumbuna (Oct.) ! Mabonto (Oct.) ! Kanya (Oct.) ! Ivory Coast : various localities. Liberia : Cape Palmas. Kakatown ! Grand Bassa. Exsicc.—*Whyte. Thomas* 3001 ; 3118 ; 3494 ; 3817.
7. **O. calantha** *Gilg* l.c. 259. A glabrous shrub or tree, up to about 30 ft.
S. Nigeria : Brass ! Asaba ! Calabar ! Also in Cameroons. Exsicc.—*Barter* 1832. *Leslie* 31. *Williams* 18.
8. **O. flava** *Hutch. & J. M. Dalz.* ex *Stapf* Bot. Mag. t. 9023. *Gomphia flava* Schum. & Thonn.—Stapf 586. *G. macrocarpa* Hook. f. *Ouratea spinuloso-serrata* Gilg l.c. 265 –Chev. Bot. 109. *O. Afzelii* A. Chev. Bot. 107, not of Gilg. A glabrous shrub, 3–15 ft. high, or a small tree ; leaves oblong or obovate-oblong, acute or shortly acuminate, shortly petioled, sometimes up to 10 in. long.
Common from French Guinea to Nigeria (north to R. Benue) and Cameroons. Extending to Angola. Exsicc.—*T. Vogel* 225. *Mann* 271. *Whyte. Thomson* 50. *Johnson* 450 ; 901. *Dalz.* 781. *Schlechter* 13022. *Mildbraed* 7389. *Thomas* 6001 ; 6490 ; 8557 ; 8953 ; 8974 ; 9114. *Chev.* 20650.
9. **O. Vogelii** *Engl.*—Gilg l.c. 271. *Gomphia Vogelii* Hook. f.—F.T.A. 1 : 321 ; Stapf 586. *Ouratea spiciformis* A. Chev. Bot. 109. *O. squamosa* A. Chev. Bot. 109, not of Engl. A shrub up to 15 ft. ; leaves lanceolate to oblong, 4–7 in. long, 1–2 in. broad.
French Guinea : Kouria ! Mamou (Jan.) ! Farana (Jan.) ! Liberia : Grand Bassa (April, July) ! Sinoe Basin ! Gold Coast : Axim ! Exsicc.—*T. Vogel* 53. *Whyte. Burton & Cameron. Chev.* 18196 ; 20366 ; 20479.
10. **O. reticulata** *Engl.*—Gilg l.c. 266 ; Chev. Bot. 108. *Gomphia reticulata* P. Beauv. Fl. Owar. 2 : t. 72—F.T.A. 1 : 320. A glabrous shrub or small tree, up to about 20 ft. high ; leaves lanceolate or oblanceolate-oblong, 3–6 in. long, 1–2 in. broad ; panicle 8–12 in. long.
Widely distributed throughout the area from Senegal and Gambia to Cameroons, chiefly in the coastal regions, but occurring in N. Nigeria (Jemati) ! Flowering in almost any month ; up to 3,000 ft. (See Appendix).
11. **O. Turnerae** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *Gomphia Turnerae* Hook. f. *Ouratea Afzelii* Gilg. *O. excavata* A. Chev. A shrub, about 20 ft., with slender branches.
Sierra Leone : Leicester Peak (Dec.) ! and vicinity ! Exsicc.—*Miss Turner. T. Vogel* 104 ; 134. *Sc. Elliot* 3834. *Chev.* 17763.
12. **O. glaberrima** *Engl.*—Gilg l.c. 263. *Gomphia glaberrima* P. Beauv. Fl. Owar. 2: t. 71—F.T.A. 1 : 322. *O. insculpta* Gilg l.c. Resembling the last, with rather larger flowers having pedicels articulated above the base, in subsimple racemes.
Gold Coast : Kintampo (Mar.) ! Tano River (Sept., Dec.) ! Togo : Sokode (Mar.). N. Nigeria : Allowa (Feb.) ! S. Nigeria : Lagos (Aug.) ! Also in Cameroons. Exsicc.—*Barter* 2205. *Dalz.* 43 ; 428. *Brent* 36.
13. **O. micrantha** *Hook. f.*—F.T.A. 1 : 321, as var. of *Gomphia reticulata* P. Beauv. Shrub, 15 ft. high.
Fernando Po : Clarence Peak, 5,000 ft. (Nov.) ! Exsicc.—*Mann* 568.
14. **O. Morsonii** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A glabrous shrub.
Sierra Leone ! Exsicc.—*Morson.*
15. **O. Oliveriana** *Gilg* l.c. 261. *O. Poéguinii* A. Chev. Bot. 108. A glabrous shrub, up to 9 or 10 ft. high ; leaves obovate-oblong or oblong, rather long-acutely acuminate, up to over 6 in. long, 1–2½ in. broad.
Ivory Coast : Guidéko (June) ! S. Nigeria : Cross River ! Rio del Rey ! Johann-Albrechtshöhe (April) ! Mundame (Feb.). Also in French Cameroons. Exsicc.—*Johnston* (no numbers). *Staudt* 606. *Chev.* 19059.
16. **O. congesta** *Engl.*—Gilg l.c. 261. *Gomphia congesta* Oliv.—F.T.A. 1 : 322 ; Stapf 585. A shrub ; leaves 4½–7 in. long, 2–2½ in. broad, lateral nerves 10–15 on each side ; racemes dense, 3–4 in. long.
Sierra Leone : Kennema (Jan.) ! Ronietta (Nov.) ! Magbile (Dec.) ! Liberia : Kakatown ! Exsicc. —*Herb. Brown. Whyte. Lane-Poole* 177. *Thomas* 5287 ; 5364 ; 5984. (See Appendix).
17. **O. ambacensis** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A shrub ; leaves up to 10 in. long, lateral nerves 15–20 on each side ; raceme 4–5 in. long.
S. Nigeria : Ambas Bay (Feb.) ! Tiko (Jan.) ! Exsicc.—*Mann* 12. *Dunlap* 171.
18. **O. coriacea** *De Wild. & Th. Dur.*—Gilg l.c. 261. A shrub ; leaves coriaceous, obovate-elliptic, acuminate, up to 6–8 in. long, 2–3 in. broad ; panicle 4–6 in. long, flowers close-fasciculate.
Gold Coast ! S. Nigeria : Lagos Colony ! Also in Cameroons and Congo, Ubangi-Shari, Eastern Sudan and Uganda. Exsicc.—*Farmar* 388. *Rowland.*
19. **O. Barteri** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A shrub of 10–12 ft. or more.
S. Nigeria : Brass ! Also in St. Thomas Isl. and Angola. Exsicc.—*Barter* 13 ; 1876.
20. **O. pauciflora** *Gilg* l.c. 256. A glabrous much-branched shrub.
S. Nigeria : Johann-Albrechtshöhe (Jan.) ! Exsicc.—*Staudt* 567.
21. **O. acutissima** *Gilg* l.c. 255. A shrub or tree, with glabrous or slightly puberulous branchlets.
Sierra Leone : R. Scarcies ! Batkanu (April) ! Exsicc.— *Afzelius. Sc. Elliot* 5916.
22. **O. affinis** *Engl.*—Gilg l.c. 257 ; Chev. Bot. 107. *Gomphia affinis* Hook. f.—F.T.A. 1 : 320, partly. A shrub, 12–15 ft.
Ivory Coast : various localities ! Fernando Po (Jan.) ! Also in Cameroons and Ubangi-Shari. Exsicc.—*Mann* 171.
23. **O. calophylla** *Engl.*—Gilg l.c. 257. *Gomphia calophylla* Hook. f., partly—F.T.A. 1 : 320 (excl. Fernando Po specimen). A glabrous shrub or small tree, up to 18 ft. high, with coriaceous leaves.
Sierra Leone : Freetown ! S. Nigeria : Barombi ! Common in French Cameroons. Exsicc.—*Don. Preuss* 462.
24. **O. calophylloides** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *Gomphia calophylla* Hook. f., partly (Fernando Po specimen). Like the preceding.
Fernando Po (Nov.) ! Exsicc.—*T. Vogel* 104.

FIG. 85.—LOPHIRA ALATA *Banks* (OCHNACEAE).

A, flower cut vertically. B, stamen. C, ovary. D, fruit with enlarged sepals. E, the same in vertical section. E1, fruit cut transversely. F, seed. G, seed cut vertically. H, seed cut transversely.

25. **Ouratea stenorrhachis** *Gilg* l.c. 254. A glabrous shrub or tree, with brown branches.
Cameroons: Bangwe (June)! Exsicc.—*Conrau* 194.

26. **O. myrioneura** *Gilg* l.c. 256. A small tree, with dark-green leaves.
Sierra Leone! Gold Coast: Ashanti, Kumasi! S. Nigeria: Idah! Lagos (Nov.)! Awka! Agolo! Also in French Cameroons. Exsicc.—*T. Vogel* 134. *Barter* (no number). *Thomas* 468; 909. *Cummins* 224. *Dodd* 422.

Imperfectly known Species.

O. decrescens *A. Chev.* Bot. 107. *Notocampylum decrescens* Van Tiegh. *N. Chevalieri* Van Tiegh. *N. nigricans* Van Tiegh. A shrub, 3–6 ft. high.
French Sudan: Fincolo (April). Soukouraba (May). Exsicc.—*Chev.* 770; 880; 881.—Not found in Chevalier's herbarium.

O. glomerata *A. Chev.* Bot. 108. *Monelasmum glomeratum* Van Tiegh. A low shrublet, with a simple woody stem about 1 ft. high.
Ivory Coast: between Fort Binger and Mt. Nienokoué (July). Also in Gabon. Exsicc.—*Chev.* 19518.
Remarkable specimens collected by Mann (No. 813) on the Bagroo River, by H. N. Thomas (No. 7674) at Kennema, Sierra Leone, and by Bunting (No. 138) in Liberia are evidently almost this species. The uppermost leaf is transformed into a rhachis bearing numerous stalked glands, and recalls *Drosophyllum* in the *Droseraceae*.

3. LOPHIRA Banks—F.T.A. 1 : 173, under *Dipterocarpaceae*.

A large tree when growing in moist forest, becoming smaller in dry savannah regions; leaves obovate-oblong to elongate-oblanceolate, rounded or emarginate at the apex, gradually or abruptly narrowed into a short or long petiole at the base, sometimes unequal-sided, up to about 60 cm. long and 12 cm. broad, glabrous and shining, finely reticulate; lateral nerves very numerous and close, spreading almost at right angles, anastomosing into the margin; flowers white or golden yellow, fragrant, in lax terminal pyramidal panicles; fruits bottle-shaped, bifid at the apex, about 3 cm. long, surrounded by the persistent sepals, two of which are enlarged and wing-like, one much larger than the other and up to 10 cm. long and 2 cm. broad *alata*

L. alata *Banks*—F.T.A. 1 : 174; Guill. & Perr. Tent. Fl. Seneg. t. 24; Holl. 1 : 139. *L. procera* A. Chev. Bot. 56. *L. Barteri, L. macrophylla, L. spatulata, L. Thollonii, L. lanceolata*, all of Van Tiegh. Flowering usually from Dec. to Feb.; the young leaves often bright red, and the wings of the fruit often crimson in the fresh state.
Widely distributed throughout the area from Senegal to Cameroons, Gabon, and also to Eastern Sudan, Uganda, etc. (See Appendix).

4. SAUVAGESIA Linn.—F.T.A. 1 : 111, under *Violaceae*.

A low, decumbent or erect glabrous herb; leaves oblanceolate, acute, narrowed to the base, about 2 cm. long, with conspicuous parallel nerves raised on the upper surface, serrulate on the margin; stipules paired, persistent, pectinate, about 5 mm. long; flowers solitary, axillary, white to pink, the pedicels becoming decurved in fruit and subarticulated towards the base; capsule enclosed by the persistent green sepals .. .. *erecta*

S. erecta *Linn.*—F.T.A. 1 : 111; Holl. 1 : 57; Chev. Bot. 35.
Damp meadows throughout the area, and in other parts of tropical Africa, Madagascar and tropical America. (See Appendix.)

60. ANCISTROCLADACEAE

Scandent shrubs with hook-like branchlets. Leaves alternate, simple, entire, leathery; indumentum absent; stipules inconspicuous or caducous. Flowers hermaphrodite, actinomorphic, small, soon falling off, in terminal panicles, the branches of which are recurved. Calyx-tube at first short, at length adnate to the base of the ovary, with imbricate lobes; tube adnate to the fruit, with spreading wing-like unequal lobes. Petals 5, unequal, contorted, slightly connate at the base. Stamens perigynous, 5 or 10; anther-cells slightly unequal, with a shortly produced connective. Ovary 1-celled; ovule solitary; style thick and fleshy, with 3 stigmas. Fruit turbinate, surrounded by the wing-like calyx-lobes, with a leathery indehiscent pericarp. Seed subglobose; testa intruding between the folds of the embryo; cotyledons strikingly folded.

A small family with a remarkable distribution, i.e. the tropical West African rain-forest and Indo-Malaya. Distinguished by the hooked branches, accrescent calyx and remarkable seeds.

ANCISTROCLADUS Wall.—F.T.A. 1 : 174.

Characters of the family.

Leaves closely and prominently reticulate on both surfaces, rigidly coriaceous, elongated-oblong-obovate, gradually narrowed into the winged petiole, rounded or acuminate at the apex, 20–30 cm. long, 6–10 cm. broad, with about 8 pairs of rather weak lateral nerves; hooks stout, spirally curved; inflorescence divaricately

branched ; pedicels 2 mm. long, jointed at the apex ; sepals oblong, obtuse, 3–4 mm. long, glabrous ; petals obovate, about 8 mm. long ; fruit turbinate, about 2·5 cm. long including the unequally accrescent wings, sharply angular .. 1. *Barteri*

Leaves thinly coriaceous, narrowly obovate to oblanceolate, long-attenuated to the base, rounded or subacute at the apex, finely reticulate especially below, 10–35 cm. long, 3·5–9 cm. broad, with about 10 pairs of rather prominent lateral nerves ; hooks stout ; inflorescence slender and laxly branched ; pedicels slender, about 4 mm. long, jointed below the apex ; sepals ovate, 3–4 mm. long ; petals glabrous ; fruits not seen .. .. 2. *guineensis*

Leaves thinly coriaceous, elliptic, abruptly narrowed into the winged petiole, rounded at the apex, closely reticulate above, 6–8 cm. long, 3–4 cm. broad, with about 5 pairs of slender lateral nerves ; hooks slender ; inflorescence rather shortly corymbose ; pedicels 3 mm. long ; petals tomentose outside ; fruits not seen 3. *uncinatus*

1. **Ancistrocladus Barteri** *Van Tiegh.* in Journ. de Bot. 1903 : 154. A shrub, about 14 ft.
Sierra Leone : In forest on hills facing the sea (Dec.) ! Kora, R. Scarcies (fr. Feb.) ! Talla Hills (Feb.) ! Exsicc.—*Sc. Elliot* 3841 ; 4797 ; 4860.
2. **A. guineensis** *Oliv.*—F.T.A. 1 : 175. A scandent shrub.
S. Nigeria : Onitsha ! Calabar River (Feb.) ! Exsicc.—*Barter* 1699. *Mann* 2234.
3. **A. uncinatus** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A scandent shrub.
S. Nigeria : Eket ! Exsicc.—*Talb.* 3108.

Fig. 86.—Ancistrocladus guineensis *Oliv.* (Ancistrocladaceae).

A, flower. B, stamens, front and back. C, cross-section of ovary. D, Ancistrocladus Barteri *Van Tiegh.*, fruit enclosed in enlarged calyx.

61. DIPTEROCARPACEAE

Trees with resinous wood. Leaves alternate, entire, penninerved ; indumentum often of two kinds, of stellate hairs or rarely of peltate scales ; stipules mostly small and deciduous, sometimes very large and enclosing the young bud, rarely persistent, leaving an annular scar after falling away. Flowers hermaphrodite, actinomorphic, fragrant, in axillary panicles. Calyx-tube short or well developed, free or adnate to the ovary ; lobes 5, imbricate or valvate, mostly greatly enlarged, wing-like, and ascending in fruit and then strongly nervose, rarely small and reflexed or spreading. Petals 5, much contorted, free or slightly connate at the base, often hairy and inconspicuous. Stamens rarely definite, hypogynous or subperigynous ; filaments short, often dilated at the base ; anthers 2-celled, opening lengthwise ; connective mucronate or aristate or club-shaped. Ovary inserted on the broad torus or slightly immersed in it, 3-celled ; style subulate or variously thickened, entire or 3-lobed ; ovules 2 in each cell. Fruit free from or included in the enlarged calyx-tube, rarely

closely adnate to it, indehiscent, usually 1-seeded. Seeds without endosperm ; cotyledons thick and equal or variously contorted.

A family mostly found in Indo-Malaya, very rare in Africa. Distinguished mainly by the enlarged wing-like calyx-lobes in fruit.

MONOTES DC. Prodr. 16, 2 : 623 (1868).

Calyx-lobes 5. Petals 5, hairy. Stamens numerous ; anthers with produced connective. Calyx-lobes equally enlarged in fruit.

A shrub or small tree ; branchlets pubescent ; leaves elliptic or oblong-elliptic, slightly cordate at the base, rounded and emarginate at the apex, 7–12 cm. long, 4–7 cm. broad, glabrescent above and finely reticulate, softly tomentose below, with about 14–16 pairs of prominent lateral nerves ; petiole 1·5–2·5 cm. long ; flowers greenish, in short axillary cymes, the whole inflorescence densely and softly tomentose ; fruit ovoid-globose, about 1·5 cm. in diam., pilose, surrounded by the dry reticulate obovate-oblong accrescent calyx-lobes about 4 cm. long .. .. *Kersting*

FIG. 87.—MONOTES KERSTINGII *Gilg* (DIPTEROCARPACEAE).

A, under-surface of leaf. B, sepal, outer surface. C, sepal, inner surface. D, E, petals, outer and inner surface. F, stamens, from front and behind. G, ovary with style. H, cross-section of ovary. I, vertical section of fruit. J, seed. K, embryo. L, flower in vertical section.

M. Kerstingii *Gilg* in Engl. Bot. Jahrb. 41 : 288—Chev. Bot. 56. *Caraipa ? africana* Oliv.—F.T.A. 1 : 172. *Monotes caloneurus* Gilg, partly—Hutch. in Kew Bull. 1921 : 358. Sometimes a tree, up to 45 ft.
French Sudan : Dio (Jan.) ; Siguiri (Feb.). French Guinea : Kouroussa (Dec.) ! Togo : Sokode-Basari, in open savannah (fl. and fr. May, Oct.) ! N. Nigeria : Naraguta (Aug.) ! Fairly common in savannah-forests ; on the Niger (without locality) ! Extends through Ubangi-Shari-Chad to Eastern Sudan. Exsicc. —*Baikie*. *Lely* 517. *Kersting* 2. *Pobéguin* 597. (See Appendix).

62. MYRTACEAE

Trees or shrubs. Leaves simple, mostly entire, opposite or rarely alternate, glandular-punctate ; stipules 0 or rarely very small. Flowers mostly actinomorphic, hermaphrodite or polygamous by abortion. Calyx-tube more or less adnate to the ovary ; lobes 3 or more, imbricate or valvate or irregularly split. Petals 4–5, rarely 6 or 0, inserted on the margin of the disk lining the calyx-tube, imbricate or connivent in a mass. Stamens numerous, rarely few, inserted on the margin of the disk, 1- or more-seriate, inflexed in bud or twice folded or straight ; filaments free or connate at the base into a short tube or in bundles opposite the petals ; anthers small, 2-celled, opening lengthwise by slits or rarely

by apical pores, the connective often tipped by a gland. Ovary inferior, syncarpous, 1- to many-celled, with mostly axile, rarely parietal placentas; ovules rarely solitary or few. Fruit inferior, loculicidally dehiscent or indehiscent. Seeds with no (or very little) endosperm; embryo straight, incurved, circular or spiral.

Flowers solitary or fasciculate, axillary; sepals distinct; petals falling off separately 1. **Eugenia**

Flowers in terminal cymes; calyx more or less truncate; petals more or less calyptrate and falling off together .. .. 2. **Syzygium**

1. EUGENIA Linn.—F.T.A. 2 : 436.

Stems short and simple from an underground rhizome, puberulous; leaves elliptic-lanceolate, obtuse at the apex, subacute at the base, 7–10 cm. long, 3–4·5 cm. broad, closely gland-dotted, puberulous below; flowers axillary, solitary, pedicels 2–3 cm. long .. .. 1. *subherbacea*

Stems much branched; shrubs or trees:

Leaves cordate at the base, more or less ovate:

Pedicels about 1·5 cm. long; branchlets glabrous; leaves shortly acuminate, 4–5 cm. long .. .. 2. *uniflora*

Pedicels very short, up to 4 mm. long; branchlets softly pubescent; leaves not acuminate, 2·5–4 cm. long .. .. 3. *nigerina*

Leaves rounded to acute at the base:

Leaves rounded or obtuse at the apex, not acuminate or if slightly so then very small and not more than 3·5 cm. long:

Leaves usually very small, about 2 cm. long; flowers very small, about 2 mm. long in bud; low shrublet, with the habit of a *Buxus* .. .. 4. *rupestris*

Leaves 3 cm. or more long; flowers larger, at least 5 mm. long in bud:

Branchlets pubescent; pedicels solitary or paired, slender, up to 1·5–2 cm. long; leaves elliptic, up to 6 cm. long and 3 cm. broad, closely dotted 5. *Kerstingii*

Branchlets glabrous; pedicels up to 1 cm. long, several in each cluster; otherwise similar to preceding .. .. 6. *coronata*

Leaves more or less distinctly acuminate:

Calyx-lobes pubescent all over the outside:

Flowers sessile or subsessile:

Branchlets glabrous or nearly so; lateral nerves about 8–10 pairs; leaves oblong-elliptic, cuneate at the base, gradually acuminate .. .. 7. *obanensis*

Branchlets densely rusty-pilose; lateral nerves 5–6 pairs; leaves acute at the base, abruptly long-acuminate or subcaudate .. .. 8. *Buchholzii*

Flowers on fairly long pedicels:

Lateral nerves obscure, scarcely looped; leaves oblong-oblanceolate, obtusely acuminate, shortly petioled, 6–9 cm. long, 2·5–3·5 cm. broad; pedicels 0·5–1·5 cm. long .. .. 9. *Elliotii*

Lateral nerves prominent, forming a distinct intramarginal nerve; leaves elliptic, obtusely acuminate, subsessile, 8–9 cm. long, 4–5 cm. broad; pedicels 3–3·5 cm. long .. .. 10. *togoensis*

Calyx-lobes glabrous (often glandular) outside:

Flowers on fairly long or long pedicels about 6 mm. long or more, always few together:

Pedicels very slender and thread-like, up to 6 mm. long; ovary glabrous; bracteoles oblong, small; leaves lanceolate, acutely cuneate at the base, up to 8 cm. long .. .. 11. *salacioides*

Pedicels very slender and thread-like, 1 cm. long or more; ovary glabrous; bracteoles oblong, small .. .. 12. *leonensis*

Pedicels stouter, nearly 2 cm. long; ovary tomentellous; bracteoles broadly ovate, large, 2 mm. long; leaves elliptic-obovate, shortly acuminate, 5–8 cm. long, 2–4·5 cm. broad, coriaceous, with about 4–5 pairs of lateral nerves slightly prominent on both surfaces, shining above .. .. .. 13. *calycina*

Flowers very shortly pedicellate or subsessile, usually more or less clustered, if rather long-pedicellate then flowers numerous:

Ovary and pedicels quite glabrous; leaves oblong-elliptic, obtuse, gradually acuminate, very shortly cuneate, 8–12 cm. long, 3–4·5 cm. broad, chartaceous, with 6–10 pairs of lateral nerves more prominent below:

Leaves rather long-petiolate; branchlets glabrous .. .. 14. *Whytei*

Leaves subsessile; branchlets shortly pilose .. .. .. 15. *Afzelii*

Ovary and pedicels pubescent :
Leaves mostly rather long-cuneate at the base, rather long-acuminate, not hairy below ; flowers subsessile :
Leaves narrowly oblong-elliptic, rather gradually acuminate, the acumen about one-eighth the length of the blade .. .. .. 7. *obanensis*
Leaves broadly elliptic, abruptly long-acuminate or subcaudate, the acumen about one-quarter the length of the blade .. .. .. 8. *Buchholzii*
Leaves rounded or very obtusely and shortly cuneate at the base, very minutely pubescent below :
Pedicels about 4 mm. long :
Leaves broadly elliptic, very obtusely and shortly acuminate, with about 10 or more straight nerves which loop and form a nearly straight marginal nerve, 9–15 cm. long, up to 9 cm. broad .. .. 16. *fernandopoana*
Leaves elongate-elliptic, with nerves as above, subcoriaceous, 9–15 cm. long, 4–5·5 cm. broad, obtuse at the base ; fruits depressed-globose, over 1 cm. broad .. .. 17. *memecyloides*
Leaves oblong-lanceolate, with about 6 ascending nerves widely looped and not forming a definite marginal nerve .. .. .. 18. *Dawei*
Pedicels very short, not more than 2 mm. long ; leaves oblong-elliptic, rounded or shortly cuneate at the base, 10–20 cm. long, 4–7 cm. broad, firmly chartaceous, with about 10 pairs of lateral nerves ; branchlets rusty-tomentellous 19. *calophylloides*

FIG. 88.—EUGENIA CALYCINA *Benth.* (MYRTACEAE).
A, bracteoles, outer and inner surface. B, sepal. C, petal. D, E, anthers, front and back. F, flower with petals and stamens removed. G, cross-section of ovary. H, flower in vertical section.

1. **Eugenia subherbacea** *A. Chev.* in Bull. Soc. Bot. Fr. 58, Mém. 8d : 170. *E. herbacea* A. Chev., not of Berg. A plant of the dry bush, throwing up annual stems after burning ; flowers fairly large, white, fragrant ; fruit succulent.
Gold Coast : Salaga (April) ! Also in Ubangi-Shari-Chad. Exsicc.—*Dalz.* 12.
2. **E. uniflora** *Linn.* Sp. Pl. 470—F.T.A. 2 : 437, and Chev. Bot. 267, as *E. Michelii* Lam. A shrub or small tree ; fruit smooth, red, with sulcate margin.
Introduced from Brazil and cultivated in gardens as the "Pitanga Cherry."
3. **E. nigerina** *A. Chev.* Bot. 268, name only. A shrub, up to 20 ft. or more, often in clumps ; flowers white, fragrant.
French Sudan : between Dialiba and Langana (Jan.) ! San (June) ! Koulikoro (Oct.) ! Ivory Coast : Bettié, Indénié Prov., on dunes of the Comoé R. (Mar.) ! Exsicc.—*Chev.* 260 ; 1075 ; 3010 ; 17556.
4. **E. rupestris** *Engl. & v. Brehm.* in Engl. Bot. Jahrb. 54 : 330. A low much-branched shrub, like the European Box.
Sierra Leone : on rocks at the top of Sugar Loaf Mt. (Mar., April) ! Exsicc.—*Dalz.* 933. *Sc. Elliot* 5770.
5. **E. Kerstingii** *Engl. & v. Brehm.* l.c. 333. A shrub, 10–12 ft. ,with shining leaves and white flowers.
Togo : Sokode-Basari plateau on rocky open ground, 2,100 ft. (May). N. Nigeria : Nupe ! Abinsi (Mar.) ! Yola (Dec.) ! Exsicc.— *Kersting* 742 (not seen). *Barter* 1318. *Dalz.* 83 ; 765.
6. **E. coronata** *Schum. & Thonn.*—F.T.A. 2 : 437 ; Chev. Bot. 266, incl. var. *macrophylla* A. Chev. *E. coronata* Vahl. *E. littorea* Engl. *E. myrtoides* G. Don. A shrub or small tree, up to 20 ft., very similar to the preceding species.
French Guinea : several localities (Mar., April). Sierra Leone ! Gold Coast : Accra (Aug.) ! Aframsu (Dec.) ! Togo : near Lome ! N. Nigeria : Borgu ! Exsicc.—*Barter* 876. *Chipp* 593. *Dalz.* 123. *Warnecke* 119 ; 378. *Chev.* 12345.

7. **Eugenia Vobanensis** *Bak. f.* in Cat. Talb. Nig. Pl. 30. A shrub, erect or sometimes half-scrambling; leaves shining; flowers small, white, in axillary clusters.
S. Nigeria: Lagos! Apapa (Feb.)! Oban! Fernando Po! Exsicc.—*Talb.* 1651. *Barter* 2192. *Mann* 263. *Moloney*. *Dalz.* 1397.

8. **E. Buchholzii** *Engl.* in Notizbl. Bot. Gart. Berl. 2: 291. A shrub; branchlets, petioles and flowers densely rusty-pilose; flowers solitary; fruit subglobose.
S. Nigeria: Oban! Exsicc.—*Talb.* 1722.

9. **E. Elliottii** *Engl. & v. Brehm.* l.c. 331. *E. djalonensis* A. Chev. Bot. 267, name only. A shrub or small tree; young branchlets rusty-tomentose; flowers fairly large, white.
French Guinea: several localities; up to 4,200 ft. (Jan.–April)! Sierra Leone: Talla Hills, on a precipice on Mt. Gonkwi (Feb.)! Exsicc.—*Sc. Elliot* 4832. *Farmar* 315. *Chev.* 12853.

10. **E. togoensis** *Engl.* l.c. 288. A shrub, pale-pilose on young branchlets and petioles.
Togo: in savannah near Bismarcksburg (Feb.). Exsicc.—*Buettner* 413 (not seen).

11. **E. salacioides** *Laws.* ex *Hutch & J. M. Dalz.* in Kew Bull. 1927, ined. *E. salicifolia* Laws., not of DC. or Berg.—F.T.A. 2: 437. A glabrous shrub or small tree; flowers very small.
Sierra Leone: Bagroo R. (April)! Sierra Leone Mts. (May)! Limba country, several localities (April)! Exsicc.—*Mann* 842. *Sc. Elliot* 5476; 5483; 5542; 5622.

12. **E. leonensis** *Engl. & v. Brehm.* l.c. 329. A shrub; branchlets rusty-pilose when young; leaves shortly petioled; flowers solitary in the axils, small.
French Guinea: Kindia! Sierra Leone: Sugar Loaf Mt., 2,500 ft. (Dec.)! Falaba (Mar.)! Konnoh! Exsicc.—*Barter* (no number). *Sc. Elliot* 3963; 5156. *Burbridge* 484; 496; 503.

FIG. 89.—SYZYGIUM GUINEENSE *DC.* (MYRTACEAE).

A, flower with corolla removed. B, the same in vertical section. C, anthers, front and back, showing gland at tip of connective. D, fruits. E, cross-section of fruit.

13. **E. calycina** *Benth.*—F.T.A. 2: 437; Stapf 603. A shrub, with coriaceous leaves and fairly large white flowers 1 in. or more across.
Liberia: Grand Bassa (July)!] Monrovia (Jan.–Mar.)! Sinoe Basin! Exsicc.—*T. Vogel* 85. *Whyte. Straub* in *Herb. Cook* 10.

14. **E. Whytei** *Sprague* in Journ. Linn. Soc. Bot. 37: 98—Stapf 604; Chev. Bot. 269. A glabrous shrub, up to 20 ft. or more, with subcoriaceous leaves and white flowers.
French Guinea: several localities (Mar., April)! Liberia: Monrovia! Sinoe Basin! Ivory Coast: Cavally estuary (Aug.). Berebi (Aug.). Exsicc.—*Whyte.*

15. **E. Afzelii** *Engl.* in Notizbl. Bot. Gart. Berl. 2: 290. A shrub, with slender pilose branchlets; leaves smooth above.
Sierra Leone. Exsicc.—*Afzelius* (not seen).

16. **E. fernandopoana** *Engl. & v. Brehm.* l.c. 337. A shrub or tree, up to 25–30 ft., with slender branchlets; fruits subglobose on pedicels of ¼ in.
Fernando Po: on the beach! Bokoko (Oct.). Exsicc.—*Mann* 269; 1439. *Mildbraed* 6921.

17. **E. memecyloides** *Benth.* -F.T.A. 2: 437; Stapf 604; Chev. Bot. 267. A shrub, apparently with simple straight stems from the ground, about 4 ft. long; leaves coriaceous.
Liberia: Grand Bassa (July)! ? locality! Ivory Coast: Sassandra (May). Exsicc.—*T. Vogel* 96. *Cook* 100.

18. **E. Dawei** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A shrub, with puberulous branchlets and white flowers.
Sierra Leone: Mata Kahun (Mar.)! Exsicc.—*Dawe* 454.

19. **E. calophylloides** *DC.*—F.T.A. 2: 437; Stapf 603; Chev. Bot. 266. A shrub, sometimes half scrambling, with rusty-downy twigs, coriaceous leaves, and small white flowers in dense axillary clusters; fruit about ¼ in. in diam., densely covered with glandular warts.
French Guinea: Nora (Sept.)! Koniaukè country (Feb.)! between Ditinn and Diagulssa (April). Sierra Leone: Freetown (May)! Limba, near Bafodeya (April)! Falaba (Mar., April)! Sherboro, Bonthe (Feb.)! Liberia: Monrovia! Ivory Coast: Cavally Basin, between Tabou and Berebi (Aug.). N. Nigeria: Lokoja, Mt. Patti (April)! Jamata (Dec.)! Also in Cameroons. Exsicc.—*Sc. Elliot* 5465; 5548. *Aylmer* 53. *Lane-Poole* 273. *Dalz.* 1010. *Elliott* 53; 220. *Pobéguin* 819.

Eugenia Jambos Linn., the Rose Apple, from tropical America, is frequently cultivated, and is reported to be naturalised near Regent, Sierra Leone. The leaves are narrowly lanceolate, gradually and long-acuminate, 15–20 cm. or more long, about 3 cm. broad ; flowers large and few in a cyme ; fruit white to pink, about 4 cm. in diam.

2. SYZYGIUM Gaertn. Fruct. 1 : 166, t. 33 (1788).

Leaves very shortly acuminate ; branches usually terete ; inflorescence usually branched twice or more ; flowers numerous and small .. .. 1. *guineense*

Leaves rather long-acuminate, acumen about 1 cm. long ; branches distinctly angular or almost winged ; inflorescence usually simply branched ; flowers larger and rather stout .. .. 2. *Rowlandii*

1. **S. guineense** *DC.* Prodr. 3 : 259—Guill. & Perr. Tent. Fl. Seneg. 315, t. 72. *Eugenia owariensis* P. Beauv. Fl. Owar. 2 : 20, t. 70. *E. macrocarpa* and *E. sudanica*, both of A. Chev. Bot. 267–8. *Syzygium owariense* Benth. in Fl. Nigrit. 359—Holl. 2 : 320. A tree, 20–30 ft., usually evergreen, with shining leaves, white flowers and edible fruit turning black when ripe ; flowering Jan.–April.

Common throughout the area both near the coast from Senegal to Fernando Po, and in the interior. Also in most other parts of tropical Africa. (See Appendix).

2. **S. Rowlandii** *Sprague* in Bull. Herb. Boiss., Sér. 2, 5 : 1170—Stapf 604 ; Chev. Bot. 268. A shrub or small tree, much resembling the preceding species.

Sierra Leone : Bandajuma ! Jala (Jan.) ! Liberia : Grand Bassa (July) ! Kakatown ! Ivory Coast : several localities. S. Nigeria : Lagos Colony ! Exsicc.—*T. Vogel* 111. *Burbridge* 477. *Aylmer* 213. *Dinklage* 1843.

FIG. 90.—PETERSIA AFRICANA *Welw.* (LECYTHIDACEAE).

A, inflorescence. B, fruiting branch. C, bundle of stamens. D, stamens, front and back. E, cross-section of fruit. F, vertical section of ovary.

63. LECYTHIDACEAE

Trees or shrubs ; leaves simple, alternate, not gland-dotted but sometimes with large glands on the margin ; stipules absent. Flowers usually rather large and showy, actinomorphic or zygomorphic, hermaphrodite. Calyx 4–6-lobed, lobes valvate or imbricate. Petals 4–6, free or united into a campanulate tube and then with many ribs. Stamens numerous, in several series, sometimes the outer ones modified into staminodes and resembling a corona ; filaments mostly united ; anthers basifixed or rarely adnate, opening at the side by slits ; staminal disk sometimes lobed. Ovary inferior or semi-inferior, 2- or more-celled ; style mostly simple ; ovules 1 to many on axile placentas, sometimes pendulous from near the apex of the cells. Fruit woody, fibrous or fleshy, indehiscent or operculate at the apex. Seeds without endosperm ; embryo divided or entire.

Petals 4, free from each other ; fruits with large membranous wings ; anther-cells divergent .. .. 1. **Petersia**

Petals united into a broad campanulate many-ribbed often spreading tube ; fruits not winged ; anther-cells parallel :

Corona absent ; stamens very numerous, in several series ; filaments filiform ; ovary nearly superior .. .. 2. **Craterantlus**

Corona present (probably formed of staminodes), in 2 series, the outer linear or thread-like, spreading, the inner ascending or erect, of broader petaloid segments ; fertile stamens in a single series, with broad flat filaments ; ovary inferior ; leaves with small marginal glands or a pair at the base ; fruit like a pomegranate **3. Napoleona**

1. PETERSIA Welw.—F.T.A. 2 : 438.

A tree, up to 40 m. high ; leaves obovate, acutely acuminate, long-cuneate at the base, 10–16 cm. long, 5–7·5 cm. broad, thin, obscurely toothed, glabrous, often with large pits in the axils of the lateral nerves ; petiole short, puberulous ; flowers several in a short panicle ; pedicels about 2 cm. long, jointed below the middle ; calyx-lobes rounded and shortly ciliate ; petals 4, glabrous ; fruit almost orbicular, emarginate, 4–5 cm. broad, 4-winged, wings membranous and reticulately veined, the principal nerves spreading at a right angle .. .. *africana*

P. africana *Welw.*—F.T.A. 2 : 439. *Combretodendron viridiflora* A. Chev. *Petersia viridiflora* A. Chev. Bot. 269. French Guinea : Kissi. Sierra Leone : Pendember (fr. July–Aug.) ! Ivory Coast : Bouroukrou (Dec.–Jan.) ! Haut-Cavally, Oua (April) ! Gold Coast : Mpraeso (fr. Jan.) ! E. Akim (June) ! Abetifi (June) ! Dunkwa (fr. Aug.) ! Aburi (fr. Mar.) ! S. Nigeria : Lagos Col. ! Benin ! Degema ! Also in Cameroons, Gabon and Angola. Exsicc.—*Dawe* 542. *Johnson* 885 ; 1081. *Brent* 399. *Thompson* 78. *Talb.* 3746. *Chev.* 16102. (See Appendix).

2. CRATERANTHUS Bak. f. in Cat. Talb. Nig. Pl. 35, t. 5 (1913).

A tree, up to 36 m. high ; branchlets with broad foliaceous wings between the leaves ; leaves elongate-oblong-obovate, shortly and obtusely acuminate, unequally cordate at the base, up to 40 cm. long and 12 cm. broad, thinly coriaceous, glabrous ; lateral nerves 10–18 pairs, looped and forming a crenate intramarginal nerve ; veins scarcely evident ; petiole very short and thick ; flowers axillary, subsessile, showy ; bracts in 2 series, leathery ; calyx deeply 3-partite, segments broadly obovate, very concave, about 2·5 cm. long, glabrous ; corolla widely campanulate, with numerous strong projecting ribs outside, about 3·5 cm. long .. .. *Talbotii*

C. Talbotii *Bak. f.* in Cat. Talb. Nig. Pl. 36, t. 5. A tall tree ; flowers showy ; calyx leathery, with membranous margins ; corolla crimson with paler margin.
S. Nigeria : Oban ! Exsicc.—*Talb.* 5 ; 5a ; 1643.
Baker distinguishes two varieties : var. *parvifolius*, with smaller more obtuse leaves and rose-pink flowers ; and var. *multibracteatus*, with more series of bracts.

3. NAPOLEONA P. Beauv.—F.T.A. 2 : 439.

Flowers solitary or clustered, on simple pedicels, sometimes on the older branches or on the stem ; calyx glabrous, puberulous or rarely minutely scabrid-setulose :
Corolla unequally and rather deeply divided into several segments :
Calyx-lobes not or slightly warted ; acumen of leaves not spathulate :
Flowers borne in fascicles on the old wood ; calyx puberulous :
Flowers 5–10 in a cluster, pale cream, mauve at the base of the inner corona ; leaves narrowly oblong-lanceolate, rather oblique, rather abruptly long-acuminate, unequal at the base, 12–20 cm. long, 3·5–5 cm. broad, with about 10 pairs of lateral nerves looped and forming a double marginal nerve ; fruits 10-lobed .. .. 1. *Talbotii*
Flowers 10–30 in a cluster, cream with mauve markings at the base of the inner corona ; leaves oblong or oblong-oblanceolate, acuminate, 25–26 cm. long, about 6 cm. broad, with 7–9 pairs of looped lateral nerves ; fruits 5-lobed 2. *Gascoignei*
Flowers axillary ; calyx glabrous ; leaves rather abruptly acuminate, oblong or oblong-oblanceolate, cuneate at the base, 18–24 cm. long, 5–7 cm. broad, with about 8–9 pairs of lateral nerves .. .. 3. *megacarpa*
Flowers axillary ; calyx puberulous and slightly rugose ; leaves abruptly acuminate, rounded at the base, 15–25 cm. long, 6–10 cm. broad ; lateral nerves about 10 or more pairs, tertiary nerves numerous and parallel ; corolla scarcely longer than the calyx, yellow ; corona white .. .. 4. *Mannii*
Calyx-lobes prominently warted outside ; acumen of leaves spathulate ; for further characters see below .. .. 10. *parviflora*
Corolla undivided or shortly toothed on the margin ; flowers mostly axillary :
Calyx quite glabrous, neither papillose nor puberulous :
Leaves abruptly very shortly and obtusely acuminate, acumen not more than 5 mm. long ; lamina oblong-elliptic, about 14 cm. long and 6–7 cm. broad, with about 10 pairs of lateral nerves ; corolla yellow in the upper part, rose in the lower ; inner corona white, dark-pink at the base .. .. 5. *Miersii*
Leaves rather long-acuminate, acumen about 1 cm. long or more :
Leaves rather gradually acuminate, obovate-elliptic, shortly cuneate at the base, about 15 cm. long and 6 cm. broad, with about 8–10 pairs of lateral nerves, rather prominently reticulate below ; corolla apricot-yellow in the upper part, red-purple in the lower ; outer corona greenish-yellow, inner corona yellow ; fruits depressed-globose, 5-lobed, about 7 cm. in diam. .. 6. *Heudelotii*

Leaves abruptly acuminate ; acumen about 1 cm. long :
Flowers lemon-yellow, axillary, subsessile ; leaves obovate-elliptic, obtuse at the base, 15–20 cm. long, 6–9 cm. broad, with 2 small glands towards the base of the acumen ; lateral nerves about 6 pairs, laxly reticulate below 7. *lutea*
Flower ultramarine-blue ; leaves oblong-elliptic, toothed and with a pair of glands at the base of the acumen, rather unequal and cuneate at the base, 12–20 cm. long, 5–9 cm. broad, with about 6–8 pairs of lateral nerves, prominently reticulate below .. .. 8. *imperialis*
Leaves rather abruptly acuminate ; acumen usually about 2 cm. long, with 2 conspicuous glands and dentate on each side at its base ; lamina oblong-elliptic, up to 20 cm. long and 9 cm. broad, prominently reticulate on both surfaces, with about 10 pairs of lateral nerves ; flowers creamy with pink or red streaks 9. *cuspidata*

Calyx rather densely papillose or puberulous :
Leaves long-caudate-acuminate ; acumen 1·5 cm. long, rather spathulate at the apex ; lamina oblong, shortly cuneate at the base, about 12 cm. long and 4 cm. broad, laxly reticulate ; lateral nerves looped well within the margin ; flowers small ; calyx warted and puberulous outside .. .. .. 10. *parviflora*

FIG. 91.—NAPOLEONA VOGELII *Hook. & Planch.* (LECYTHIDACEAE).
A, vertical section of flower. B, style and stigma. C, fruit. D, cross-section of fruit. E, vertical section of fruit. Partly after Hook. Ic. Pl.

Leaves abruptly rather long-acuminate ; acumen not spathulate ; lamina oblong, 10–20 cm. long, 4–6 cm. broad, laxly reticulate below :
Lateral nerves prominently looped within the margin with a secondary marginal nerve outside ; flowers axillary .. .. 11. *leonensis*
Lateral nerves without a secondary marginal nerve ; flowers in dense clusters on the older branchlets .. .. 12. *reptans*
Leaves shortly acuminate ; acumen about 1 cm. long, not spathulate ; lamina broadly elliptic, shortly cuneate at the base, 8–12 cm. long, 4–6 cm. broad, rather closely reticulate below ; lateral nerves ascending within the margin ; corolla yellow outside, red inside .. .. 13. *Vogelii*
Flowers paniculate on the older wood ; calyx warted outside and tomentellous ; leaves obovate, abruptly and very acutely acuminate, subacute at the base, up to 18 cm. long and 7–8 cm. broad, shining above, laxly reticulate below, with about 5 pairs of lateral nerves .. .. 14. *Egertonii*

1. **Napoleona Talbotii** *Bak. f.* in Cat. Talb. Nig. Pl. 32. A tree, with slightly angled branchlets.
S. Nigeria : Oban (Aug.) ! Exsicc.—*Talb.* 170 ; 173 ; 190 ; 195 ; 196 ; 198 ; 202.
2. **N. Gascoigni** *Bak. f.* l.c. 33. A tree ; fruit about 1½ in. in diam.
S. Nigeria : Oban ! Exsicc.—*Talb.* 1223.
3. **N. megacarpa** *Bak. f.* l.c. 31. Apparently a tree, with angled branchlets ; flowers about 1½ in. in diam., sometimes in the older axils.
S. Nigeria : Oban ! Barombi (Sept.) ! Exsicc.—*Talb.* 173 ; 194 ; 197. *Preuss* 560.
4. **N. Mannii** *Miers* in Trans. Linn. Soc., Ser. 2, 1 : 11. A tree, 20–25 ft., with rather strong pale striate branches and large leaves.
Fernando Po ! Exsicc.—*Mann* 590.

5. **Napoleona Miersii** *Hook. f.* Bot. Mag. t. 7199. A shrub or small tree, often of rather scrambling habit; flowers sometimes on the older wood as well as axillary.
N. Nigeria: Lokoja, Mt. Patti (Feb., Mar., April)! Agaie (Nov.–Mar.)! Exsicc.—*Elliott* 38; 50. *Dalz.* 90. *Yates* 33.
6. **N. Heudelotii** *A. Juss.* in Ann. Sci. Nat., Sér. 3, 2: 227, t. 4. *N. Whitfieldii* Van Houtte in Flore des Serres, Sér. 1, 4: t. 386–7. A tree; flowers usually solitary in the axils.
French Guinea: Futa Jallon! Rio Nunez! Sierra Leone: ? locality! Daragbe, Samu country (Dec.)! Kambui, Bullom! Exsicc.—*Heudelot* 748. *Sc. Elliot* 4299. *Smythe* 96.
7. **N. lutea** *Bak. f.* ex *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A tree.
S. Nigeria: Eket! Exsicc.—*Talb.* 3173.
8. **N. imperialis** *P. Beauv.* Fl. Owar. 2: 30, t. 78—Miers l.c. 7: F.T.A. 2: 439, partly. *N. Alexandri* Talb. & Bak. f. A tree, sometimes in swampy forest; flowers often in the axils of the older leaves or on the old wood.
S. Nigeria: Warri! Lagos, Ikoyi (Dec.–Mar.)! Degema! Eket! Oban! Exsicc.—*Dalz.* 1399. *Talb.* 997a; 3179; 3183; 3765.
9. **N. cuspidata** *Miers* l.c. 10. *N. imperialis* P. Beauv. var. *cuspidata* Engl. Habitat, etc., as for *N. imperialis*.
S. Nigeria: Calabar (Feb.)! Lagos, Ikoyi (Dec.–Mar.)! Degema! Eket! Oban! Also in Cameroons. Exsicc.—*Mann* 2272. *Barter* 20144. *Dalz.* 1182. *Talb.* 1375; 1400; 2277; 3109; 3174; 3176; 3177; 3178; 3180; 3182; 3185; 3765; 3771.
10. **N. parviflora** *Bak. f.* in Cat. Talb. Nig. Pl. 30. A tree with pale angled branchlets; flowers small, with the innermost whorl of the corona not bent outwards.
S. Nigeria: Abeokuta! Oban! Also in Cameroons. Exsicc.—*Talb.* 72; 170; 193; 575. *Unwin* 8.
11. **N. leonensis** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A small tree; flowers rather pale-reddish, solitary in the axils.
French Guinea: Kouria, at edge of Bowali marsh (Nov.)! Sierra Leone: Talla Hills (Feb.)! Commendi (Nov.)! Liberia: ? locality! Exsicc.—*Sc. Elliot* 4892. *Aylmer* 264. *Chev.* 15054. *Cook* 263.
12. **N. reptans** *Bak. f.* ex *Hutch & J. M. Dalz.* l.c. Flowers in clusters on the old wood.
S. Nigeria: Eket! Exsicc.—*Talb.* 3175.
13. **N. Vogelii** *Hook. & Planch.* in Hook. Ic. Pl. tt. 799–800 –Chev. Bot. 270. A shrub or tree, up to 50 ft.; flowers axillary or sometimes on the old wood.
Sierra Leone: Scarcies, Wallia (Feb.)! Kora R. (Feb.)! Liberia: Cape Palmas (July)! Ivory Coast: various localities. Gold Coast: Kukurantumi (Dec.)! W. Ashanti, Fiapere (Feb.)! Togo: ? locality! S. Nigeria: Lagos Colony! Igbeshe (Oct.)! Awka! Exsicc.—*T. Vogel* 45. *Sc. Elliot* 4554; 4798. *Johnson* 269. *Chipp* 86. *Foster* 26. *Kersting* 630. *Dinklage* 1992.
14. **N. Egertonii** *Bak. f.* in Cat. Talb. Nig. Pl. 33. A tree.
S. Nigeria: Oban! Exsicc.—*Talb.* 997.

64. MELASTOMATACEAE

Herbs, shrubs or trees; branches opposite. Leaves simple, opposite or verticillate, mostly with 3 to 9 longitudinally parallel nerves; stipules 0. Flowers hermaphrodite, mostly very showy, actinomorphic. Calyx tubular, free or adnate to the ovary, or sometimes connected to it by septa-like strands; lobes imbricate or rarely valvate. Petals imbricate, free, rarely united at the base. Corona sometimes present. Stamens the same to double the number of the petals; filaments free, often geniculate, inflexed; anthers 2-celled, opening by a pore at the apex or rarely by a slit (*Memecylon*), connective often appendaged at the base. Ovary mostly inferior, 1- to many-celled; style simple; ovules numerous, axile, or rarely basal or parietal. Fruit a capsule or berry. Seeds minute, without endosperm.

A large tropical family, easily recognised by the opposite exstipulate leaves often with very marked parallel main nerves, geniculate stamens, anthers opening by pores and usually inferior ovary.

Excluded genus: *Ditinnia rupicola* A. Chev. Bot. 279 = *Remusatia vivipara* Schott (Araceae).

Ovary 4–5-celled, with numerous ovules; fruit with numerous small seeds; flowers usually fairly large and showy; anthers opening by a pore and mostly fairly long; mostly herbaceous:
Stamens with equal and similar anthers, or slightly unequal in size only but not in structure; connective not or only shortly produced at the base (and then equally so in all the anthers) and with or without basal appendages:
Ovary completely free from the calyx-tube .. .. **1. Nerophila**
Ovary partially or wholly adnate to the calyx-tube:
Ovary without a ring of hairs, bristles or scales on the top:
Appendage of the connective not spurred at the base:
Calyx-tube glabrous; petals 5 .. .. **2. Guyonia**
Calyx-tube long-pilose; petals 4 .. .. **3. Afzeliella**
Appendage of the connective with one or two spurs produced at the base:
Ovary adhering by ribs to the calyx-tube; anther-connective without a dorsal spur .. .. **4. Dinophora**
Ovary completely adherent at least in the lower part:
Anther-connective without a dorsal spur; sepals distinct and persistent; herb **5. Tetraphyllaster**
Anther-connective with a dorsal spur; calyx subtruncate; perennial and subwoody:
Ovary half-adherent to the calyx; flowers in lax cymes **6. Phaeoneuron**
Ovary completely adherent to the calyx; flowers in dense globose heads **7. Myrianthemum**

Ovary with a ring of bristles or scales on the top :
Ovary with a ring of bristly hairs on the top :
Calyx-lobes with alternating supplementary lobes :
Flowers capitate ; ovary half-adnate to the calyx-tube .. 8. **Antherotoma**
Flowers paniculate ; ovary wholly adnate to the calyx-tube 9. **Osbeckia**
Calyx lobes without alternating lobes ; ovary partially adnate to the calyx : flowers capitate .. .. 10. **Tristemma**
Ovary with a cup or ring of scales at the top ; calyx-tube truncate or undulately lobed :
Connective without a spur behind the single appendage .. .. 11. **Calvoa**
Connective with a spur behind the appendage or appendages :
Leaves long-petiolate ; appendage to the connective single ; herb 12. **Preussiella**
Leaves subsessile ; 2 appendages to the connective ; shrub 13. **Medinilla**
Stamens with equal anthers, the connective long-produced at the base with 2 spur-like appendages in front ; ovary adherent by ribs to the calyx-tube, minutely bristly on the top ; flowers paniculate, with 2 bracteoles below each .. 14. **Sakersia**
Stamens with very unequal anthers, the connective of the larger ones always long-produced at the base and with 1–2 basal appendages :
Anther-connective of at least the larger stamens with a single appendage in front ; ovary wholly adnate to the calyx-tube, concave at the top ; fruit crowned by small scales .. .. 15. **Amphiblemma**
Anther-connective of the large stamens with 2 appendages in front, and a short spur behind ; ovary half-adnate to the calyx-tube, conical at the top ; fruit angled or winged at the top .. .. 16. **Dicellandra**
Anther-connective usually with 2 appendages in front ; ovary adnate to the calyx-tube by connecting ribs, or rarely free, bristly at the top and convex 17. **Dissotis**
Ovary 1-celled, completely adnate to the calyx-tube ; seeds large and solitary or few ; anthers very short, opening by a longitudinal slit .. .. .. 18. **Memecylon**

1. NEROPHILA Naud.—F.T.A. 2 : 441.

Herb, about 15–20 cm. high, with few scattered leaves ; leaves sessile, ovate, obtuse, about 1 cm. long, crenulate, sparingly setose on the upper surface, faintly 3-nerved ; flowers 1–3 in a head surrounded by 4 leaves ; calyx-tube glabrous ; lobes lanceolate, ciliate, with alternate setose teeth ; petals obovate ; anthers 3 mm. long *gentianoides*

N. gentianoides *Naud.*—F.T.A. 2 : 441 ; Chev. Bot. 271 ; Gilg in Engl. Monogr. Afr. Pfl. Melastom. 4, t. 1A. A herb chiefly of damp places, with small yellow flowers ; petals 4.
Senegal : in marshes of the river ! French Guinea : several localities (Sept.–Dec.) ! Exsicc.— *Heudelot* 668. *Farmar* 214.

2. GUYONIA Naud.—F.T.A. 2 : 443.

Glabrous annual with creeping stems ; branches ascending ; leaves obovate, 1–1·3 cm. long and broad, narrowed to a petiole, finely crenulate ; petiole shorter than the blade ; flowers terminal or axillary, solitary, glabrous ; calyx-lobes lanceolate, subacute ; petals ovate-oblong .. .. *tenella*

G. tenella *Naud.*—F.T.A. 2 : 443 ; Gilg in Engl. Monogr. Afr. Pfl. Melastom. 4, t. 1B.
Senegambia: Futa Jallon ; moist paces by streams. Exsicc.— *Heudelot* (not seen).

3. AFZELIELLA Gilg in Engl. Monogr. Afr. Pfl. Melastom. 4.

A small weak annual rooting at the lower nodes ; leaves ovate-rhomboid, subacute, 1–1·5 cm. long, nearly 1 cm. broad, crenulate, sparingly setose ; petiole nearly as long as the blade, slender ; flowers terminal or terminating short lateral leafy branchlets, subsessile ; receptacle glabrous ; calyx-lobes filiform, with long setose hairs *ciliata*

A. ciliata *Gilg* l.c. 5. *Guyonia ciliata* Hook f.—F.T.A. 2 : 443 ; Chev. Bot. 272. *G. gracilis* A. Chev. Bot. 272.
Sierra Leone : Waterloo ! Yetaya ! Exsicc.—*Wilford*. *Afzelius* (not seen). *Burbridge* 153. *Thomas* 2392.

4. DINOPHORA Benth.—F.T.A. 2 : 444.

A glabrous shrub with slender branches ; leaves sparse, ovate-oblong, cordate at the base, acutely acuminate, 5–14 cm. long, 3–6 cm. broad, almost membranous, 5–7-nerved at the base, serrate with mucronate teeth ; tertiary nerves almost at right angles, subparallel, rather distant ; flowers in lax terminal dichotomous panicles ; pedicels slender ; calyx-tube smooth, dentate ; petals ovate-lanceolate, about 1 cm. long ; stamens 10, subequal, the connective produced below and 2-lobed ; fruit broadly ellipsoid, with very thin walls, splitting irregularly .. *spenneroides*

D. spenneroides *Benth.*—F.T.A. 2 : 445 ; Gilg in Engl. Monogr. Afr. Pfl. Melastom. 27, t. 1 H.
S. Nigeria : Lagos Colony ! Oban ! Rio del Rey ! Fernando Po (Nov., Dec.) ! Extends to Gabon and Congo. Exsicc.—*T. Vogel* 189.

5. TETRAPHYLLASTER Gilg in Engl & Prantl Pflanzenfam., Nachtr. 266 (1897).

Herb ; leaves long-petiolate, ovate, shortly acuminate, acute, 4–6·5 cm. long, 1·5–3 cm. broad, more or less densely hairy below, 5-nerved ; flowers solitary, terminal, sessile ; bracts broadly ovate, ciliate, 7–8 mm. long ; receptacle smooth ; sepals ovate, persistent .. .. *rosaceum*

T. rosaceum *Gilg* in Engl. & Prantl Pflanzenfam., Nachtr. 266—Engl. Monogr. Afr. Pfl. Melastom. 34, t. 8A. An erect hairy herb, with fairly large rose flowers.
Cameroons Mt. : Buea, 3,000 ft. (Jan.). Exsicc.—*Preuss* 702 (not seen).

6. PHAEONEURON[1] Gilg in Engl. & Prantl Pflanzenfam., Nachtr. 267 (1897).

Pedicels up to 0·5 cm. long :
Leaves oblong-lanceolate, obtuse or slightly rounded at the base, acutely acuminate, 5–10 cm. long, 2–3 cm. broad, slightly puberulous on the 3 main parallel nerves ; tertiary nerves almost at right angles ; inflorescence nearly glabrous ; stamens unequal .. .. 1. *setosum*
Leaves ovate or ovate-elliptic, rounded or cordate at the base, subacute at the apex, up to 16 cm. long and 9 cm. broad, puberulous on the 5 main parallel nerves ; inflorescence rusty-tomentose ; stamens subequal .. .. .. 2. *Moloneyi*
Pedicels nearly 1·5 cm. long ; leaves oblong-lanceolate, acutely acuminate, slightly cordate at the base, 10 cm. long, 4·5 cm. broad, thin, glabrous, acutely denticulate ; inflorescence glabrous .. .. 3. *gracile*

1. **P. setosum** *Stapf* in Journ. Linn. Soc. Bot. 34 : 492. *Dicellandra ? setosa* Hook. f.—F.T.A. 2 : 459. *D. liberica* Gilg. A shrub or undershrub, of moist places, the older branches stout, terete, longitudinally fissured ; petals 5, rose, up to 17 mm. long.
Sierra Leone ! Liberia : Grand Bassa (Nov.) ! Exsicc.— *Afzelius. Dinklage* 1767 ; 2056.
2. **P. Moloneyi** *Stapf* in Bot. Mag. t. 7729—Stapf l.c. 494. An undershrub ; older branches terete ; petals 5, rose, 10–12 mm. long.
S. Nigeria : Lagos ! Exsicc.—*Moloney* 28.
3. **P. gracile** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *Dicellandra gracilis* A. Chev. Bot. 276, name only. An undershrub.
Ivory Coast : several localities ! Exsicc.—*Chev.* 19360–1 ; 19635 ; 19733 ; 21206.

7. MYRIANTHEMUM Gilg in Engl. & Prantl Pflanzenfam., Nachtr. 266 (1897).

A glabrous climbing shrub ; branches terete ; lower leaves alternate, upper verticillate, obovate-elliptic, acute or shortly acuminate, entire, 15–30 cm. long, 5–13 cm. broad, 5-nerved at the base, nerves impressed above and prominent below ; flowers very numerous in a globose head up to 13 cm. in diam. ; pedicels slender, 3·5 cm. long ; calyx truncate, constricted above the ovary ; petals 4, obovate .. *mirabile*

M. mirabile *Gilg* in Engl. Monogr. Afr. Pfl. Melastom. 33, t. 7.
S. Nigeria : Oban ! Also in Cameroons and Gabon. Exsicc.—*Talb.* 1325.
Var. **dentatum** *Bak. f.* in Cat. Talb. Nig. Pl. 128. Leaves dentate.
S. Nigeria : Oban ! Exsicc.—*Talb.* 587.

8. ANTHEROTOMA Hook. f.—F.T.A. 2 : 444.

An annual herb, up to 1 ft. high ; stems appressed-setose ; leaves few, shortly petiolate, lanceolate, acute, 3–4 cm. long, 0·5–1·2 cm. broad, crenate, setose above and only on the nerves below, 3-nerved ; flowers in a close terminal cluster subtended by leaves ; pedicels about 3 mm. long ; calyx-tube laxly setose, lobes narrowly lanceolate, stellately bristly at the top, with alternating narrower lobes ; anther-connective produced at the base into 2 short lobes ; ovary bristly at the apex *Naudinii*

A. Naudinii *Hook. f.*—F.T.A. 2 : 444 ; Gilg in Engl. Monogr. Afr. Pfl. Melastom. 9, t. 1F. Petals 4, pink or mauve.
N. Nigeria : Bauchi Plateau, Naraguta (Aug.) ! Vom, 3,000–4,500 ft. ! Extending to Abyssinia, Angola, Central and East Africa, and to Natal and Madagascar. Exsicc.—*Lely* 536. *Dent Young* 93.

9. OSBECKIA Linn.—F.T.A. 2 : 441.

Calyx-lobes linear-subulate, bristly on the margin and at the tip, falling off in fruit ; leaves ovate or lanceolate, rounded at the base, acutely acuminate, 6–9 cm. long, 2–3 cm. broad, 5–7-nerved, strigose ; petiole 1–1·5 cm. long ; calyx-tube densely strigose ; petals obovate, rose-coloured ; fruit broadly campanulate, about 8 mm. long, shortly setose .. .. 1. *liberica*
Calyx-lobes broadly lanceolate :
Leaves ovate, distinctly petiolate, rounded at the base, acute at the apex, about 5 cm. long and 2·5 cm. broad, 5-nerved, long-pilose on both surfaces ; petiole 1–1·5 cm. long ; flowers solitary or in flexuous cymes, subsessile ; calyx-tube stellate-bristly in the lower $\frac{2}{3}$, narrowed above and produced in fruit .. .. 2. *tubulosa*

[1] For critical notes on this genus and *Dicellandra* Hook. f., see Stapf in Journ. Linn. Soc. Bot. 34 : 482 (1900).

FIG. 92.—OSBECKIA TUBULOSA *Sm.* (MELASTOMATACEAE).

A, portion of stem. B, vertical section of flower. C, stamen. D, ovary and style. D1, cross-section of ovary. E, embryo. F, fruiting branch. G, stellate-bristly scale from calyx-tube. H, bristle. I, under-surface of leaf.

Leaves oblong or oblong-lanceolate ; subsessile :
Calyx-lobes deciduous in fruit, bristly at the tips ; leaves about 3 cm. long, 1 cm. broad, 3-nerved, setulose-pubescent below ; fruit contracted below the top, 10-ribbed and finely setose .. .. 3. *senegambiensis*
Calyx-lobes persistent in fruit, setose-ciliate ; stems long-setose, especially at the nodes ; leaves about 2·5 cm. long and 1 cm. broad, pilose on the nerves ; fruits subglobose, setose-pilose .. .. 4. *congolensis*

1. **Osbeckia liberica** *Stapf* in Journ. Linn. Soc. Bot. 37 : 98. A somewhat hairy herb ; flowers rose, about ½ in. across, in scanty panicles ; often in swampy land.
Sierra Leone : several localities ! Liberia : Monrovia ! Kakatown ! Sinoe Basin ! ? locality ! Exsicc. —*Whyte* (no numbers). *Sc. Elliot* 5788. *Thomas* 3530 ; 4681 ; 7684 ; 8147. *Cook* 47 ; 108 partly ; 440.
2. **O. tubulosa** *Sm.*—F.T.A. 2 : 442 ; Gilg in Engl. Monogr. Afr. Pfl. Melastom. 9, t. 1 E ; Chev. Bot. 271. An erect annual, 18 in. high, with 4-angled stems, bristly on the angles ; flowers small ; petals 5, pale pink.
French Sudan : Koulikoro (Oct.) ! French Guinea : ? locality ! Dalaba-Diaguissa plateau, 3,000–4,000 ft. (Oct.) ; Grandes Chutes (Dec.). Sierra Leone : several localities ! Liberia : Kakatown ! Togo : Misahöhe (Nov.) ! N. Nigeria : Lokoja, Patti (Nov.) ! Panshanu ! Exsicc.—*T. Vogel* 4. *Barter* (no number). *Sc. Elliot* 3828. *Brown* 46. *Thomas* 3194. *Mildbraed* 7313.
3. **O. senegambiensis** *Guill. & Perr.*—F.T.A. 2 : 443 ; Gilg l.c. 8. *O. saxicola* A. Chev. Bot. 271, not of Gilg. Stems erect from a woody rootstock, branched, stout, 4-angled, 12–18 in.
Senegal : near Cape Verde (Mar.) ! Casamance, Zinguinchor (Jan.) ! Exsicc.—*Dollinger*. *Chev.* 3015.
4. **O. congolensis** *Cogn.* ex *Buettn.* in Verh. Bot. Brand. 31 : 95—Gilg l.c. 6 ; Chev. Bot. 270–1. *O. senegambiensis* A. Chev. l.c., not of Guill. & Perr. In damp sand or marshy places ; flowers rose-red.
French Sudan : Tabacco (Jan.) ! Gourma (July) ! French Guinea : Kollangui (Mar.) ! Farana (Jan.) . Kouroussa ! Futa Jallon, 3,000–4,000 ft. ! Sierra Leone : Falaba (Mar.) ! Yetaya, 1,100 ft. (Sept.) ! Ivory Coast : Orodougou, Mid. Sassandra (June) ! Also in Gabon and Congo. Exsicc.—*Sc. Elliot* 5172! *Farmar* 244. *Thomas* 2321. *Chev.* 12879 ; 15718 ; 18411 ; 18839 ; 20507.

Imperfectly known Species.

O. decandra *DC.* Prodr. 3 : 143. Founded on an imperfect specimen from Sierra Leone collected by Afzelius.

10. TRISTEMMA Juss.—F.T.A. 2 : 445.

Calyx-tube glabrous outside except at the base :
Branches glabrous or nearly so ; flowers blue or pale rose ; leaves ovate-elliptic, rounded or subacute at the base, 5–15 cm. long, 4–6 cm. broad, shortly appressed-setose above, almost glabrous below, 5-nerved .. .. .. 1. *littorale*
Branches setose ; flowers sometimes white ; leaves broadly elliptic, acute at both ends, 6–12 cm. long, 4–6·5 cm. broad, rather long-appressed-strigose above, shortly setose on the 5 nerves below .. .. 2. *albiflorum*
Calyx-tube with scattered hairs in the upper half, the hairs not in rings ; stems long-pilose-setose ; leaves ovate or ovate-elliptic, somewhat rounded at the base, acutely acuminate, 6–8 cm. long, 3–4 cm. broad, long- and short-setose above and below, 5-nerved ; petiole shaggy, 1–2 cm. long .. .. .. 3. *involucratum*
Calyx-tube with 1 or more distinct rings of bristles :
Stems and petioles densely bristly-pilose ; leaves ovate-elliptic, rounded at the base, acutely acuminate, 8–12 cm. long, 4–6 cm. broad, 5-nerved, long- and short-setose on both surfaces ; petiole 1·5–3 cm. long, flattened and long-setose-pilose ; bracts pilose-setose .. .. 4. *hirtum*
Stems and petioles slightly setose or nearly glabrous :
Flowers solitary or paired, rarely 3 ; calyx with more than one ring of hairs ; leaves ovate-elliptic, rather rounded at the base, subacute, 6–10 cm. long, 4–7 cm. broad, setulose on both surfaces, 5-nerved ; petiole slender, 1·5–2 cm. long 5. *coronatum*
Flowers several in a head ; calyx with a single ring of hairs ; leaves broadly ovate-elliptic, rounded or shortly cuneate at the base, 10–15 cm. long, 5–8 cm. broad, 5-nerved, appressed-setose above, nearly glabrous below ; petiole slender 6. *incompletum*

1. **T. littorale** *Benth.* in Fl. Nigrit. 353—Gilg in Engl. Monogr. Afr. Pfl. Melastom. 25. *T. papillosum* Gilg. *T. Schumacheri* Guill. & Perr. var. *littorale* Hook. f.—F.T.A. 2 : 446. A prostrate or suberect undershrub, 3–5 ft. or more ; stems obtusely angled, often wiry ; flowers pink to bluish-purple ; in wet places.
S. Nigeria : Lagos Colony ! Ikoyi (Sept.) ! Ilesha ! Oloke Meji ! Fernando Po (June, Nov., Dec.) ! Also in Ubangi-Shari, Congo and Princes Isl. Exsicc.—*T. Vogel* 90. *Mann* 61. *Foster* 174 ; 297. *Dalz.* 1086.
2. **T. albiflorum** *Benth.* l.c. 353—Gilg l.c. 25, as *T. incompletum* R.Br. *T. Schumacheri* Guill. & Perr. var. *albiflorum* Hook. f.—F.T.A. 2 : 446. Stems rough on the angles ; flowers white.
Sierra Leone : Freetown (June) ! Exsicc.—*T. Vogel* 7.
3. **T. involucratum** *Benth.*—F.T.A. 2 : 445 ; Gilg l.c. 24, t. 1 K. Procumbent, diffusely branched ; heads solitary.
Sierra Leone : Freetown ! Exsicc.— *Afzelius*. *Don*. *Barter* (no number).
4. **T. hirtum** *Vent.*—F.T.A. 2 : 446 ; Gilg l.c. 26 ; Stapf 605 ; Chev. Bot. 272. A hirsute herb or undershrub, 3–4 ft. ; flowers lilac to red ; in marshy places and waste lands.
Common in the coastal districts from Liberia to Cameroons and Fernando Po, and in N. Nigeria up to 4,500 ft. on the Bauchi Plateau. Extending to Congo and Upper Shari. Exsicc.—*T. Vogel* 39. *Barter* 1314 ; 2109 ; 2171. *Mann* 6. *Whyte*. *Cook* 108 (partly).
5. **T. coronatum** *Benth.*—F.T.A. 2 : 446 ; Gilg l.c. 25, t. 1 L ; Chev. Bot. 272. Half-prostrate herb or undershrub, 1–3 ft. ; flowers rose.
Sierra Leone : Freetown ! Ronietta (Nov.) ! Ivory Coast : Guidéko (May) ; Davo (May) ; Baoulé-Nord (July). Gold Coast : Hills (Oct.) ! Axim ! Kumasi ! Dahomey : Sakété (Feb.). Exsicc.— *Afzelius*. *Don*. *Cummins* 150. *T. W. Brown* 351. *Thomas* 5444.

6. **Tristemma incompletum** *R.Br.*—F.T.A. 2 : 446, and Chev. Bot. 272, as *T. Schumacheri* Guill. & Perr.; Gilg l.c. 25, partly. A low undershrub, with strongly angled branches; leaves often crimson below; flowers pink to purple; sometimes amongst rocks but also in marshy places.
Senegal! Gambia! Casamance (Feb.)! French Guinea: Konakry and Iles de Los (Feb.)! Sierra Leone: many localities! Ivory Coast: several localities! Togo: Bismarcksburg (flowering all the year); Adadia (half in water). N. Nigeria: Dekina (June)! S. Nigeria: Rio del Rey! Extends to Angola and to Eastern Sudan. Exsicc.—*Heudelot* 78. *Ingram* (no number). *Barter* (no number). *Sc. Elliot* 4019; 4411; 5878. *Elliott* 240. *Thomas* 679; 4884; 5888; 9212. *Chev.* 3016; 12243; 15269; 16545; 16910; 19493; 20112.

11. CALVOA Hook. f.—F.T.A. 2 : 457.

A small herb, with hirsute stems and leaves; leaves ovate-elliptic, subcordate, not acuminate, 4–6 cm. long, 2–3·5 cm. broad, 5-nerved; petiole up to 2 cm. long; flowers subsessile, solitary to clustered; calyx-tube strongly ribbed, subtruncate; stamens 10, unequal; ovary crowned with 5 persistent leathery broad scales projecting beyond the calyx; fruit crowned by the scales .. .. 1. *hirsuta*
A glabrous herb; leaves obovate, unequal-sided at the base, 3-nerved, 4–6 cm. long, 2·5–3·5 cm. broad, thin; flowers rose, sessile, on one side of the axis; fruits ribbed, 6–7 mm. long; scales venose, widely emarginate .. .. .. 2. *monticola*

1. **C. hirsuta** *Hook. f.*—F.T.A. 2 : 457; Gilg in Engl. Monogr. Afr. Pfl. Melastom. 32, t. 5E. Branched annual, 6–8 in. high.
Fernando Po, 6,000 ft.! Exsicc.—*Mann* 285.
2. **C. monticola** *A. Chev.* Bot. 275, name only. Epiphyte, or terrestrial.
French Guinea: Nzerekore, 1,900 ft. (June)! Ivory Coast: various localities; in swamps or on granite soil, up to 1,200 ft.! Exsicc.—*Chev.* 19476. *Collenette* 37.

12. PREUSSIELLA Gilg in Engl. & Prantl Pflanzenfam., Nachtr. 267 (1897).

A glabrous epiphytic woody herb; leaves long-petiolate, ovate, slightly cordate and 5-nerved at the base, shortly and gradually acuminate, 6–11 cm. long, 3–5·5 cm. broad; flowers rose, in short terminal cymes; receptacle smooth; calyx undulately lobed; petals 5, obovate-oblong; ovary cup-shaped on the top *kamerunensis*

P. kamerunensis *Gilg* in Engl. & Prantl Pflanzenfam., Nachtr. 267.
S. Nigeria: Barombi, Elephant Lake (Aug.). Exsicc.—*Preuss* 442 (not seen).

13. MEDINILLA Gaud.—F.T.A. 2 : 460.

A glabrous shrubby plant; branches subterete, with thickened nodes; leaves subsessile, lanceolate, rounded at the base, long-acuminate, 7–11 cm. long, 1·5–2·5 cm. broad, 3-nerved, entire, glabrous; cymes very small, few-flowered; petals 4, white *Mannii*

M. Mannii *Hook. f.*—F.T.A. 2 : 460. Epiphyte, 4 ft. high.
Fernando Po! Exsicc.—*Mann* 302.

14. SAKERSIA Hook. f.—F.T.A. 2 : 458.

Branches nodose, obtusely 4-angled, shortly bristly; leaves elliptic or oblong-elliptic, rounded at the base, subacutely acuminate, 6–12 cm. long, 3–6 cm. broad, 5-nerved, with fairly distinct slightly oblique parallel tertiary nerves, sparingly setulose; petiole about 1 cm. long; panicle many-flowered; calyx with a pair of caducous bracteoles at the base, smooth, shortly and broadly toothed; petals glabrous, conical and closely twisted in bud; fruits campanulate, about 1 cm. long, sparingly bristly towards the apex .. .. 1. *africana*
Branches with very thick nodes and longer bristles at the nodes; leaves elliptic, slightly cuneate at the base, about 11 cm. long and 4·5 cm. broad, 5-nerved; petiole 1·5 cm. long; panicle lax-flowered; bracteoles very caducous; calyx distinctly lobed, lobes broad, ciliate; petals ciliate; fruits with a ring of bristles at the tip 2. *echinulata*

1. **S. africana** *Hook f.*—F.T.A. 2 : 458; Gilg in Engl. Monogr. Afr. Pfl. Melastom. 32; Chev. Bot. 276. A tree, 15–30 ft., of wet places; highly ornamental in flower; petals rose.
Ivory Coast: between Malamalasso and Daboisué (Mar.); Grabo, etc. (July). S. Nigeria: Oban! Cameroons R. (Jan.)! Also in French Cameroons, Spanish Guinea and Gabon. Exsicc.—*Mann* 2205.
2. **S. echinulata** *Hook. f.*—F.T.A. 2 : 458; Gilg l.c. 32, t. 5 F; Chev. Bot. 276. *S. mirabilis* A. Chev. A small tree, "at a distance resembling a peach-tree in full blossom." Flowers red.
French Guinea: several localities! Sierra Leone: Kofiu Mt., Scarcies (Jan.)! Exsicc.—*Afzelius. Sc. Elliot* 4599. *Farmar* 330. *Chev.* 12393.

15. AMPHIBLEMMA Naud.—F.T.A. 2 : 455.

Herb; stems puberulous; leaves ovate, cordate at the base, subacutely acuminate, 8–16 cm. long, 5–10 cm. broad, slightly setulose, closely denticulate, 7–9-nerved at the base; petiole up to half as long as the leaf; cymes terminal; flowers mauve-pink; calyx puberulous; lobes triangular, obtuse, 1·5 mm. long; fruiting cymes elongating and secund; fruits campanulate, about 8 mm. long, crowned by short scales .. .. 1. *cymosum*
Epiphyte; stems pilose on the angles; leaves ovate, cordate, acute, up to 20 cm. long and 15 cm. broad, nearly glabrous, setulose-denticulate, about 7–9-nerved at the base; fruiting cymes not secund .. .. 2. *grandifolium*

1. **Amphiblemma cymosum** *Naud.*—F.T.A. 2 : 456 ; Gilg in Engl. Monogr. Afr. Pfl. Melastom. 30. *Calroa superba* A. Chev. Bot. 275. Herb, 2–3 ft., by streams.
French Guinea : Futa Jallon, Timbo and Ditinn (Sept.) ! Sierra Leone : Freetown and vicinity (fl. and fr. April, May) ! Mayoss (Aug.) ! Bambuna (Oct.) ! Banikoro (Oct.) ! Ivory Coast : between Zagoué and Soucourala (May) ! N. Nigeria : Naraguta (Aug.) ! Exsicc.— *Afzelius*. *Barter* (no number). *Sc. Elliot* 5825. *Thomas* 1407 ; 3932. *Lely* 544. *Chev.* 18501 ; 18528 ; 21575.
2. **A. grandifolium** *A. Chev.* Bot. 276, name only. On trees or fallen trunks, creeping the length of the stem.
Ivory Coast : between Fort Binger and Toula (July) ! Grabo (Aug.) ! Exsicc.—*Chev.* 19541 ; 19710.

16. DICELLANDRA Hook. f.—F.T.A. 2 : 459.

Stems sharply angled, roughly villous on the angles ; leaves ovate or ovate-orbicular, shortly acuminate, rounded or cordate at the base, up to 25 cm. long and 15 cm. broad, 5–7-nerved with prominent tertiary nerves at right angles ; petioles up to 15 cm. long ; inflorescence cylindric, about 6 cm. long .. .. *Barteri*

D. Barteri *Hook. f.*—F.T.A. 2 : 459 ; Gilg in Engl. Monogr. Afr. Pfl. Melastom. 33 ; Stapf in Journ. Linn. Soc. Bot. 34 : 491. An epiphyte, or herb of damp places ; stem stout, spongy, 10 ft., rooting at the nodes ; leaves often purple below ; flowers purple.
Gold Coast : Akim, Tumfa Hills, 1,500 ft. (Dec.) ! S. Nigeria : Nun R. ! Oban ! Eket ! Fernando Po (Dec.) ! Also in Cameroons. Exsicc.—*Mann* 3. *Barter* 2113. *Johnson* 50b. *Talb.* 490 ; 1275 ; 3002.

17. DISSOTIS Benth.—F.T.A. 2 : 447.

Flowers solitary to paniculate with inconspicuous or early deciduous bracts :
Calyx-tube glabrous outside except for bristle-tipped processes often between the calyx-lobes :
Leaves with a broad flattened long-setose-ciliate petiole, lanceolate or elliptic-lanceolate, acute, 6–10 cm. long, 1·5–4 cm. broad, 5-nerved, setose-pilose on both surfaces ; flowers solitary or few together, shortly pedicellate ; calyx-lobes narrowly lanceolate, ciliate and bristly-pointed, persistent, with accessory linear slender lobes between .. .. 1. *antennina*
Leaves sessile or nearly so ; calyx-lobes very rarely with accessory lobes :
Calyx-lobes with a very fine long bristle between ; flowers in paniculate cymes ; stems glabrous ; leaves lanceolate, 5-nerved, subsessile, up to 7 cm. long and 3 cm. broad, glabrous, paler below, bristly-ciliate .. .. .. 2. *Pobéguinii*
Calyx-lobes without accessory bristles or lobes :
Calyx-lobes about 1·5–2 cm. long ; leaves oblong-lanceolate or linear-oblong, obtuse or subacute, broad at the base, 3–8 cm. long, 0·6–1·3 cm. broad, sparingly ciliate, pale below and glabrous, obscurely 3-nerved ; flowers solitary ; pedicels 1 cm. long ; fruit about 2 cm. long, crowned by the persistent calyx-lobes 3. *cinerascens*
Calyx-lobes less than 1 cm. long ; leaves lanceolate, shortly narrowed at the base, up to 3 cm. long, about 0·8 cm. broad, very obscurely 3-nerved, sparingly setose-ciliate, pale below ; flowers solitary on very short pedicels ; fruit about 1 cm. long, with persistent calyx-lobes .. .. 4. *rupicola*
Calyx-tube pubescent or bristly outside :
Leaves broadly ovate, cuneate at the base, triangular-acute at the apex, 2–3 cm. long, 1·5–2·5 cm. broad, glabrous or nearly so, 3–5-nerved, rather long-petiolate ; flowers solitary, terminal ; stems decumbent, rooting at the nodes 5. *decumbens*
Leaves more or less lanceolate or if elliptic or ovate then setose or stellate-tomentose ; flowers paniculate or rarely solitary :
Flowers solitary ; leaves ovate, more or less as in *D. decumbens*, but laxly setose, and petioles pilose ; calyx covered with linear ciliate processes ; stems decumbent, rooting at the nodes .. .. 6. *rotundifolia*
Flowers more or less paniculate ; leaves lanceolate to elliptic or rarely ovate :
Leaves with stellate hairs, more or less closely tomentose below :
Stems rather woody, with short branchlets ; leaves elliptic, rounded at the base, acute at the apex, 5 cm. long and about 3 cm. broad, prominently 5-nerved ; petiole about 1 cm. long, tomentose .. .. 7. *leonensis*
Stems subherbaceous, with long branches ; leaves lanceolate, sessile, 4–7 cm. long, 1–1·5 cm. broad, cinereous, strongly 5-nerved ; panicles many-flowered ; calyx setulose outside .. .. 8. *incana*
Stems subherbaceous, with long branches ; leaves broadly ovate, encircling the stem, about 9-nerved, 2–3 cm. long, about 1·5 cm. broad 9. *Gilgiana*
Leaves clothed with simple hairs or bristles :
Leaves ovate or ovate lanceolate, with 5–7 principal nerves, rounded or cordate at the base :
Leaves very shortly and laxly strigose-pubescent on the upper surface, subacute, 6–8 cm. long, 2–4 cm. broad ; calyx-tube 1 cm. long, very densely bristly, lobes broadly lanceolate .. .. 10. *Perkinsiae*
Leaves very densely strigose above, subacute, 4–8 cm. long, 2–4 cm. broad ; calyx-tube 1·3 cm. long, densely long-setose, obliquely oblong, about 1 cm. long .. .. 11. *graminicola*

Leaves long-pilose on the upper surface, acutely acuminate, up to 12 cm. long and 7 cm. broad; calyx-tube at length shortly setulose; lobes linear, ciliate, early caducous .. .. 12. *multiflora*

Leaves lanceolate or elongate-oblong-lanceolate, with 3–5 principal nerves:

Leaves with fairly long petioles, rounded at the base:

Leaves very shortly setulose, with very prominent main nerves, up to 20 cm. long and 5 cm. broad; calyx at length densely setulose; stems shortly setulose .. .. 13. *Elliotii*

Leaves thickly hairy below, up to 30 cm. long and 6 cm. broad 14. *pulcherrima*

Leaves subsessile or very shortly petiolate, more or less narrowed to the base; stems long-pilose-setose, especially at the nodes:

Stems with long bristles only at the nodes; leaves 10–12 cm. long, 1·2·5 cm. broad, shortly appressed-setulose on both surfaces; petals about 4 cm. long and 3 cm. broad .. .. 15. *Lambii*

Stems with long bristles between the nodes; leaves up to 13 cm. long and 3 cm. broad, setose-pilose on both surfaces; petals 2–3·5 cm. long 16. *grandiflora*

Stems with slender hairs between the nodes; leaves 6–9 cm. long, 1–1·5 cm. broad, pilose with long slender hairs; petals 1–1·5 cm. long 17. *Irvingiana*

Flowers solitary to several in a head, usually surrounded by large persistent membranous bracts:

Petals 4; bracts inconspicuous; calyx-tube short and becoming subglobose in fruit; leaves subsessile, lanceolate, subacute, 4–6 cm. long, 1–2 cm. broad, 3-nerved, pilose; flowers small in dense heads, surrounded by the uppermost leaves; calyx-tube glabrescent in the lower part; lobes lanceolate, 3 mm. long, alternating with bristle-tipped appendages .. .. 18. *phaeotricha*

Petals 5; bracts large and conspicuous, becoming dry in fruit:

Calyx-tube with bristly hairs around the middle or all over the surface:

Leaves broadly lanceolate, acute, rounded at the base, shortly petiolate, 4–6 cm. long, 2 cm. broad, 5-nerved, slightly appressed-setulose; bracts 2 cm. long; no glandular hairs .. .. 19. *cornifolia*

Leaves broadly ovate, acutely acuminate, sometimes cordate at the base, rather long-petiolate, 5–8 cm. long, 3–5 cm. broad, 5-nerved, long-pilose; bracts pilose and ciliate; stems densely shaggy with usually gland-tipped hairs 20. *paucistellata*

Calyx-tube glabrous except at the base:

Flowers single, each surrounded by an involucre of bracts about 1 cm. long; leaves broadly lanceolate, subacute, rounded at the base, 6–10 cm. long, 2–4 cm. broad, 5-nerved, appressed-pilose on both surfaces, distinctly petiolate 21. *segregata*

Flowers several in a head with a common involucre of bracts:

Stem glabrous or nearly so, quadrangular, almost white; bracts becoming membranous and almost hyaline in fruit; leaves lanceolate or linear-lanceolate, narrowed to the base, acute, 4–8 cm. long, 1–1·5 cm. broad, 3–5-nerved, sparingly setulose .. .. 22. *theifolia*

Stems hirsute or strigose, not glandular; leaves ovate, acute, rounded at the base, 6–8 cm. long, 3–4 cm. broad, 5-nerved, strigose or pubescent on both surfaces; petiole short or up to 1 cm. long; calyx-lobes not hairy in the middle 23. *capitata*

Stems covered with soft gland-tipped hairs; leaves, etc., more or less as above, but calyx-lobes with a line of hairs up the middle .. .. 24. *Lecomteana*

1. **Dissotis antennina** *Triana* in Trans. Linn. Soc. 28 : 58—F.T.A. 2 : 451; Gilg in Engl. Monogr. Afr. Pfl. Melastom. 15. *Lignieria alpestris* A. Chev. Bot. 279. Herb, with decumbent rooting stem.
French Guinea : Futa Jallon, Dalaba-Diaguissa plateau, 3,000–4,000 ft. (Oct.) ! Sierra Leone ! Exsicc. —*Afzelius*. *Don*. *Chev*. 18781.

2. **D. Pobéguinii** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. An erect unbranched plant with pale stem and red-purple flowers.
French Guinea : Douné (Baffing R.) (Aug.) ! Exsicc.—*Pobéguin* 1695.

3. **D. cinerascens** *Hutch.* in Kew Bull. 1921 : 372. Herb, about 18 in.; flowers pink or mauve.
N. Nigeria : Naraguta, Neill's Valley (June) ! Vom, 3,000–4,500 ft. ! Exsicc.—*Lely* 259. *Dent Young* 94.

4. **D. rupicola** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. Stem creeping, rooting at the nodes; in dry places amongst rocks.
Sierra Leone : Sugar Loaf Mt. (Dec.) ! Exsicc.—*Sc. Elliot* 3977. *Hart* (no number).

5. **D. decumbens** *Triana* l.c. 58—Gilg l.c. 15. *D. laevis* Hook. f.—F.T.A. 2 : 451. Stem creeping, with erect branches, almost glabrous; flowers rose, ½–¾ in. in diam.
S. Nigeria : Nun R. (Aug.) ! Also in Cameroons, Gabon, Congo and Angola. Exsicc.—*T. Vogel* 36.

6. **D. rotundifolia** *Triana* l.c. 58—Stapf 605; Gilg l.c. 15. *D. plumosa* and *D. prostrata*, both of Hook. f.—F.T.A. 2 : 452; Chev. Bot. 274. Stems rooting at the nodes, woody below, varying from hirsute to subglabrous; flowers pink or mauve, about 2 in. in diam.
Common in damp waste places and marshes, throughout the area from French Guinea to Cameroons, up to 3,000–4,000 ft. on Bauchi Plateau. Extending to Angola, Nile Land and East Africa. Exsicc.—*T. Vogel* 152; 154; 157; 184. *Barter* 1313. *Irving* 78; 135. *Thomas* 3415; 4747; 7139. *Chev*. 21932. *Mildbraed* 7390.

7. **D. leonensis** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A small shrub, growing in crevices of rocks, flowering before the leaves.
Sierra Leone : Kessewe Hills, 1,600 ft. (April) ! Exsicc.—*Lane-Poole* 126.

8. **Dissotis incana** *Triana* l.c. 58—Gilg l.c. 17; Chev. Bot. 273. *D. canescens* Hook. f.—F.T.A. 2: 453. Stems 2–4 ft., ochre; flowers pink or deep-rose, about 1 in. in diam.; in wet places.
French Guinea: between Timbo and Farana (April)! N. Nigeria: Kontagora (Dec.)! Vom! Naraguta! Extends to Angola, Abyssinia and south to Natal. Exsicc.—*Dalz.* 82. *Lely* 720. *Dent Young* 97. *Chev* 13322.

9. **D. Gilgiana** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *D. incana* Triana var. *Gilgiana* A. Chev. Bot. 274. Plant 2–3 ft high; flowers a fine red; in moist ground.
French Sudan: Sicoro (Jan.)! between Taranora and Kangola (May)! French Guinea: Toukan to Bouria (April)! Douné (Dec.)! Ivory Coast: between Bouandougou and Marabadiassa (July)! Exsicc. —*Chev.* 228; 846; 12924; 14634; 21997.

10. **D. Perkinsiae** *Gilg* l.c. 21. An undershrub, 3–5 ft., with angular woody branches and subcoriaceous leaves; flowers reddish-violet, about 2 in. in diam.
Togo: Misahöhe, in dry sunny places (Nov.)! Bismarcksburg, in grass savannah (Feb.)! Exsicc.—*Mildbraed* 7254. *Buettner* 385.

11. **D. graminicola** *Hutch.* in Kew Bull. 1921: 371. A woody herb, 1–2 ft.; flowers handsome, bluish-purple or magenta, about 2½ in. in diam.; in wet grasslands.
N. Nigeria: Naraguta (Aug.)! Vom, 3,000–4,500 ft.! Exsicc.—*Lely* 543. *Dent Young* 95; 96.

12. **D. multiflora** *Triana* l.c. 58—Stapf 605; Gilg l.c. 18, t. 2 F; Chev. Bot. 274. *Osbeckia multiflora* Sm.—F.T.A. 2: 442. Herb with a shrubby base and 4-angled strigose branches, 2–4 ft.; panicle sometimes large; calyx ovoid; striate petals pale purple or rose; in dry, stony or grassy lands as well as moist places.
Sierra Leone! Liberia: Monrovia (July, Aug.). Ivory Coast: Attié (Feb.); Grabo (July). Togo: Misahöhe (Nov.)! S. Nigeria: Onitsha! Oban! Rio del Rey! Extends to Angola, Ubangi-Shari-Chad and Upper Congo. Exsicc.—*Afzelius. Don. Barter* 1796. *Mildbraed* 7201. *Talb.* (no number).

FIG. 93.—DISSOTIS ROTUNDIFOLIA *Triana* (MELASTOMATACEAE).

A, under-surface of leaf. B, calyx-lobe tipped with stellate bristle. C, petal. D, E, stamens. F, vertical section of flower. G, stalked stellate bristle from calyx-tube. H, cross-section of ovary.

13. **D. Elliotii** *Gilg* l.c. 19. *D. Thollonii* A. Chev. Bot. 275, not of Cogn. *D. floribunda* A. Chev. Bot. 273. An undershrub, 4–5 ft. or more high; branches 4-angled, becoming glabrous; flowers red- or blue-purple, about 4 cm. in diam.
French Sudan: Koundiam (Feb.)! French Guinea: several localities, often in swamps, etc.! Sierra Leone: Kukuna, wet places, (Jan.)! Likuru (Feb.)! Kamalu (May)! N. Nigeria: Bauchi Plateau, Vom, 3,000–4,500 ft.! Exsicc.—*Sc. Elliot* 4513; 4996. *Farmar* 170a. *Thomas* 335. *Dent Young* 99. *Chev.* 417; 12778; 13107; 15102; 18340; 20254; 20618.

14. **D. pulcherrima** *Gilg* l.c. 20. "A 9–12 ft. high, stiff, erect, unbranched shrub which only after flowering produces adventitious shoots"; branches 4-angled, densely pilose when young; flowers lilac (Jan.–Feb.).
Togo: Misahöhe; Bismarcksburg. Exsicc.—*Baumann* 387. *Buettner* 369.

15. **D. Lambii** *Hutch.* in Kew Bull. 1916: 230. Stem 4–5 ft., simple or sparingly branched; flowers handsome, mauve or blue-purple, about 3 in. in diam.
Gold Coast: Ashanti, Wanki (June)! N. Nigeria: Kaduna (Oct.)! Naraguta (June, Aug.)! Exsicc. —*Lamb* 58. *Chipp* 483. *Lely* 285; 484.

16. **D. grandiflora** *Benth.*—F.T.A. 2: 455; Gilg l.c. 21; Holl. 2: 321; Chev. Bot. 273. *D. djalonis* A. Chev. Bot. 273. Stem 1–2 ft., from a woody tuberous base; flowers purple, 2 in. or more in diam.
Senegal! French Guinea: various localities, 3,000–4,000 ft. (Jan.–Mar., Sept., Oct.)! Sierra Leone: Freetown and other localities (Feb.)! Ivory Coast: Toura country (May); Mankono (June). Exsicc.—*Heudelot* 779. *Afzelius. Sc. Elliot* 4490. *Farmar* 261. *Thomas* 2285. *Chev.* 18851.

17. **D. Irvingiana** *Hook.*—F.T.A. 2: 453; Bot. Mag. t. 5149; Holl. 2: 321; Gilg l.c. 20; Chev. Bot. 274. *Osbeckia calotricha* A. Chev. Bot. 274, partly, not of Gilg. Stems erect, branched, 4-angled, 3–4 or more ft. high; flowers rose-purple. Flourishing in moist places, but abundant also in the dry bush.
French Sudan: Sicoro (Jan.). Gambia! French Guinea: Timbo! Ivory Coast: Orodougou, Mt. Sassandra (June)! Gold Coast: Krobo (Dec.)! ? locality! Togo: Lome! Misahöhe (Nov.)! N. Nigeria: Nupe! Lokoja! Kontagora (Nov.)! Abinsi (Dec.)! Naraguta (June)! Ilorin! S. Nigeria: Abeokuta! Oloke Meji! Eruwa (May)! Lagos Colony! Ilara! Also in Cameroons and Ubangi-Shari-Chad. Exsicc.—*Irving* 119. *Barter* 1025. *Brown-Lester* 21. *Dalz.* 83. *Warnecke* 437. *Mildbraed* 7385. *Chev.* 21830. *Pobéguin* 1697.

18. **Dissotis phaeotricha** *Hook. f.*—F.T.A. 2 : 451 ; Gilg l.c. 14. *D. villosa* Hook. f.—F.T.A. 2 : 450. *Osbeckia postpluvialis* Gilg. A low branched herb, 6–18 in. high ; petals 4, mauve or purple ; in moist places and cultivated fields.
N. Nigeria : Nupe ! Kontagora (Nov.) ! Abinsi (April) ! Bauchi Plateau, 3,000–4,600 ft. (July) ! Extends to Eastern Sudan, East and South Africa and Angola. Exsicc.—*Barter* 895 ; 1315. *Dalz.* 84 ; 755. *Lely* 447. *Dent Young* 100.

19. **D. cornifolia** *Hook. f.*—F.T.A. 2 : 448 ; Stapf 605 ; Gilg l.c. 13. An almost glabrous herb ; petals 5, rose to red-purple ; in moist places.
Sierra Leone : Ronietta (Nov.) ! Banikoro (Oct.) ! Mayoso (Aug.) ! Liberia : Grand Bassa (July) ! Kakatown ! Monrovia. ? locality ! Exsicc.—*Afzelius*. *T. Vogel* 80. *Whyte*. *Thomas* 1414 ; 2892 ; 5326. *Cook* 47a ; 64.

20. **D. paucistellata** *Stapf* in Journ. Linn. Soc. Bot. 37 : 99—Holl. 2 : 321. A hirsute herb, 2–3 ft. high ; flowers rose, about 2 in. in diam., in involucrate heads. Very similar to and easily mistaken for *Tristemma hirtum*, but distinguished by the usually gland-tipped hairs, by the calyx being bristly all over, and the unequal stamens. This species may be identical with *D. Afzelii* Hook. f.—see note at end of genus.
Sierra Leone : Kabussa, Limba ! Rawala (July) ! Bumbuna (Oct.) ! Magbile (fr. Dec.) ! Liberia : Monrovia ! Kakatown ! Sinoe Basin ! ? locality ! Exsicc.—*Sc. Elliot* 5478. *Whyte*. *Thomas* 1042 ; 1480 ; 3764 ; 5891 ; 9351. *Cook* 18 ; 108 (partly) ; 434.

21. **D. segregata** *Hook. f.* F.T.A. 2 : 448 ; Holl. 2 : 321 ; Gilg l.c. 12. Stem 4-angled, with bristles at the nodes, shrubby below, 2–3 ft. ; at edges of swamps, etc. ; flowers red- or blue-purple, about 1½ in. in diam.
N. Nigeria : Nupe ! Lokoja ! S. Nigeria : Nun R. (Aug.) ! Ibo country ! Lagos Colony ! Ikoyi (April) ! New Calabar (Sept.) ! Extends to Ubangi-Shari, Angola, Congo and Zambesi. Exsicc.—*T. Vogel* 9 ; 12. *Barter* 1311.

22. **D. theifolia** *Hook. f.*—F.T.A. 2 : 449 ; Gilg l.c. 13, t. 2A ; Chev. Bot. 275. Shrubby, 2–6 ft ; branches 4-angled, with bristles at the nodes ; flowers red- to blue-purple, 1–1½ in. in diam. Often in dry rocky places.
French Guinea : Futa Jallon (Sept.–Oct.). Sierra Leone : mountains near Freetown (Dec.) ! Magbile (Dec.) ! Togo : Agome Mts., 2,000 ft. (Oct.). N. Nigeria : Lokoja, Patti (Oct.) ! Kabba (Oct.) ! Ankpa (Oct) ! Panshanu (Sept) ! S. Nigeria : Abeokuta ! Lagos Colony ! Ikoyi (Nov.) ! Onitsha ! Awka ! Also in Cameroons. Exsicc.— *Afzelius*. *Barter* 1772. *Irving* 57. *Sc. Elliot* 3840. *Thomas* 6211.

23. **D. capitata** *Hook. f.*—F.T.A. 2 : 449 ; Gilg l.c. 13 ; Chev. Bot. 273. *D. hirsuta* Hook. f.—F.T.A. 2 : 450. *D. radicans* Hook. f. ?—F.T.A. 2 : 450. Shrubby, 3–6 ft. ; branches obtusely 4-angled ; flowers bright red ; in dry sunny places.
Senegal ! French Sudan : Sikasso (May). French Guinea : Ditinn, Diaguissa, etc., 2,700–3,700 ft. (April, Sept.). Sierra Leone : Freetown (June) ! Yetaya (Sept.) ! Kaballa, 1,200 ft. (Sept.) ! Kanike (Sept.) ! Yonibana (Oct.) ! Ivory Coast : ? locality ! Togo : Abodo Mt. (July) ; near Bismarcksburg ; Ketschenki (July) ; Misahöhe (May). N. Nigeria : Nupe. Lom ! Lokoja ! Vodni, 4,600 ft. (July) ! Abinsi (June) ! S. Nigeria : Lagos Colony ! Extends to Angola and Uganda. Exsicc.—*Heudelot* 826. *Afzelius*. *T. Vogel* 175. *Barter* 1312. *Thomas* 2049 ; 2185 ; 2200 ; 2402.

24. **D. Lecomteana** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. Habit of the preceding ; about 3 ft. high ; flowers red.
French Guinea : Dindéa (Sept.) ! Sierra Leone : near Falaba ! Erimakuna (Mar.) ! Exsicc.—*Sc. Elliot* 5174 ; 5241. *Poéguin* 1699.

Imperfectly known Species.

D. Afzelii *Hook. f.*—F.T.A. 2 : 449.
Sierra Leone. Exsicc.— *Afzelius* (not seen). Described from an imperfect specimen ; possibly the same as *D. paucistellata* Stapf.

18. MEMECYLON Linn.—F.T.A. 2 : 460.

Leaves without lateral ascending nerves, only the midrib visible :
- Leaves broadly elliptic, often somewhat oblique, acutely acuminate, rather long-cuneate at the base, distinctly petiolate, 5–12 cm. long, 3–5 cm. broad, sometimes with very faint spreading lateral nerves ; flowers in lax cymes ; pedicels 3 mm. long .. .. 1. *polyanthemos*
- Leaves oblong or narrowly oblong-elliptic, very shortly and abruptly cuneate at the base :
  - Pedicels longer than the flower-buds ; branchlets terete :
    - Leaves caudate-acuminate, 10–14 cm. long, 3–5 cm. broad, shortly petiolate, acumen about 2 cm. long, with extremely faint spreading lateral nerves ; flowers very small and glomerate, the pedicels 2·5 mm. long .. .. 2. *viride*
    - Leaves gradually acuminate, elliptic, 6–8 cm. long, 2–3 cm. broad, acumen about 1 cm. long, distinctly petiolate ; flowers on a very short common peduncle 3. *candidum*
    - Leaves long-caudate-acuminate, oblong, slightly cuneate at the base, 18–20 cm. long, 5–7 cm. broad, with short flattened petioles ; flowers on very slender pedicels about 1 cm. long, on a common peduncle as long .. .. 4. *applanatum*
  - Pedicels shorter than the flower-buds ; branchlets somewhat angular :
    - Common peduncle nearly 0·5 cm. long ; fruits depressed-globose, 1·5 cm. in diam. ; leaves abruptly acuminate, 8–14 cm. long, 4–6 cm. broad, subsessile, leathery, almost nerveless, acumen 1–1·3 cm. long .. .. .. 5. *Donianum*
    - Common peduncle very short ; fruit ellipsoid, nearly 1·5 cm. long ; leaves abruptly acuminate, 10–15 cm. long, 3–5 cm. broad, distinctly petiolate, thinly leathery, nerveless, acumen 1·5 cm. long .. .. 6. *Aylmeri*

Leaves with distinct lateral ascending nerves :
- Transverse nerves between the midrib and lateral nerves invisible or nearly so below :
  - Leaves rounded to a very shortly cuneate base, coriaceous, 6–9 cm. broad :
    - Midrib and main nerves impressed on the upper surface ; pedicels very short 7. *Dinklagei*
    - Midrib and main nerves slightly raised above ; pedicels about 3 mm. long 8. *strychnoides*

Leaves gradually narrowed from about the middle to the base, 3–4 cm. broad, gradually acuminate, 6–10 cm. long; petiole about 5 mm. long; flowers very small and subumbellate in short clustered cymes; pedicels about 2 mm. long; fruit small, about 5 mm. long .. .. 9. *Barteri*

Transverse nerves between the midrib and lateral nerves conspicuous below:

Flowers very numerous in fairly long-pedunculate cymes sometimes nearly as long as the leaves; leaves ovate or ovate-elliptic, rounded and almost sessile at the base, shortly acuminate, 12–18 cm. long, 6–10 cm. broad, often purplish-brown below when dry; peduncle about 3 cm. long, finely puberulous, the principal branches of the inflorescence flattened; fruit globose, 6 mm. in diam. 10. *Spathandra*

Flowers rather few, in very small glabrous inflorescences:

Lateral transverse nerves equally prominent as the 2 ascending longitudinal nerves and forming distinct loops with them:

Leaves not cordate at the base:

Leaves very shortly petiolate, broadly oblong-elliptic or broadly ovate, acutely acuminate, rounded or slightly cuneate at the base, 10–15 cm. long, 4–7 cm. broad; flowers subumbellate on a short common peduncle; pedicels 4–5 mm. long; fruit ellipsoid .. .. 11. *Zenkeri*

Leaves rather long-petiolate, obovate-elliptic, gradually acuminate, rather long-cuneate at the base, 12–16 cm. long, 6–8 cm. broad; flowers fasciculate; pedicels about 2–3 mm. long .. .. 12. *Bakerianum*

Leaves cordate at the base, ovate or elliptic, rather long- and obtusely acuminate, up to 15 cm. long and 5 cm. broad; fruit subglobose, about 8 mm. in diam. 13. *sessile*

Lateral transverse nerves much less prominent than the ascending longitudinal nerves and not distinctly looped:

Leaves ovate, rather gradually narrowed to the acuminate apex, rounded at the base or at most slightly cuneate and rounded; lateral nerves much branched and reticulate:

Pedicels very short, the flowers closely clustered; branchlets 4-angled; leaves 6–10 cm. long, 4–6 cm. broad; ascending nerves raised and prominent on the upper surface .. .. 14. *fasciculare*

Pedicels 1–1·3 cm. long; branchlets terete; ascending nerves not raised on the upper surface; leaves 12–20 cm. long, 5–9 cm. broad .. 15. *polyneuron*

Pedicels about 5 mm. long or more, the flowers laxer; branchlets 4-angled; leaves 9–17 cm. long, 4–9 cm. broad; ascending nerves not raised on the upper surface .. .. 16. *Vogelii*

Leaves elliptic or obovate-elliptic, mostly narrowed to the base and rather abruptly acuminate; lateral nerves usually not much reticulate:

Flowers sessile or subsessile; leaves obtusely acuminate, 6–12 cm. long, 3–5 cm. broad, with rather faint lateral nerves; fruit ellipsoid, 1 cm. long 17. *membranifolium*

Flowers on long pedicels:

Leaves shortly and gradually acuminate, 6–8 cm. long, 3–4 cm. broad; peduncles once-branched, each bearing 2–3 flowers; pedicels 4 mm. long 18. *Fosteri*

Leaves rather abruptly acuminate, 10–13 cm. long, 5–9 cm. broad; peduncles often branched more than once and bearing several flowers; pedicels nearly 1 cm. long .. .. 19. *cinnamomoides*

Leaves gradually long-acuminate, cuneate at the base, 4–6 cm. long, 2–2·5 cm. broad, rather thin, distinctly petiolate, acumen about ⅓ as long as the blade; peduncles simple, about 5 mm. long; pedicels nearly as long, very slender; flowers small .. .. 20. *golaense*

1. **Memecylon polyanthemos** *Hook. f.*—F.T.A. 2 : 463; Gilg in Engl. Monogr. Afr. Pfl. Melastom. 44; Chev. Bot. 278. *M. Simii* A. Chev. Bot. 278, not of Stapf. A shrub or small tree, in damp shady woods; flowers azure, sweet-scented; berries purple.
French Guinea: Ditinn to Timbo (Mar.)! Sierra Leone: various localities! Ivory Coast: Aboisso (April)! Agniéby Valley (Jan., Feb.)! between Middle Sassandra and Middle Cavally (July)! Togo: Misahöhe (April, May)! S. Nigeria: Oban! Extends to Congo. Exsicc.—*Afzelius*. *Mann* 851. *Sc. Elliot* 4597; 4686; 5432; 5636. *Thomas* 2722; 4989. *Baumann* 551. *Chev.* 19807. *Talb.* 485.
2. **M. viride** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A glabrous shrub.
S. Nigeria: Oban! Exsicc.—*Talb.* 496.
3. **M. candidum** *Gilg* l.c. 43. A glabrous shrub, about 9 ft., with acutely 4-angled branches; flowers usually white.
S. Nigeria: Oban! Also in Cameroons. Exsicc.—*Talb.* 696; 1717.
4. **M. applanatum** *Bak. f.* in Cat. Talb. Nig. Pl. 37. A shrub, about 9–12 ft., with terete branches; "petals thin cobalt-blue."
S. Nigeria: Oban! Exsicc.—*Talb.* 1606.
5. **M. Donianum** *Planch.*—F.T.A. 2 : 463; Gilg l.c. 44. *M. Simii* Stapf. A shrub.
Sierra Leone: Freetown! Yonibana (Oct.)! Seli R. (Oct.)! Liberia: Sinoe Basin! ? locality! Exsicc.—*Don*. *Whyte* (no number). *Thomas* 3102; 4204; 4237. *Cook* 102.
6. **M. Aylmeri** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A shrub; fruit blue.
French Guinea: foot of Mt. Nzo, 1,800–2,100 ft. (fr. Mar.)! Sierra Leone: Kennema (Oct.)! Liberia: ? locality! Exsicc.—*Aylmer* 627. *Chev.* 21002. *Cook* 281.

7. **Memecylon Dinklagei** *Gilg* ex *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. Shrub; flowers small, white, very deciduous.
Sierra Leone: Yonibana (Nov.)! Liberia: Grand Bassa (Sept.)! Exsicc.—*Dinklage* 2032. *Thomas* 4816.

8. **M. strychnoides** *Baker* in Kew Bull. 1895: 105, not of Gilg. *M. Millenii* Gilg. A glabrous shrub or small tree, with cymes of small blue flowers; in swamp-forest.
S. Nigeria: Lagos, Ikoyi (Oct., Nov.)! Exsicc.—*Millen* 168. *Dalz.* 1184.

9. **M. Barteri** *Hook. f.*—F.T.A. 2: 462; Gilg in Engl. Monogr. Afr. Pfl. Melastom. 41. *M. Dinklagei* A. Chev. Bot. 277, not of Gilg. A much-branched evergreen shrub, about 8 ft. or more; flowers small, white, very fugacious; berries black-purple.
French Guinea: Kouria (Sept.)! S. Nigeria: Lagos Colony! Ikoyi (fl. Mar., fr. June)! Exsicc.—*Barter* 2152. *Dalz.* 1056; 1233. *Chev.* 14777.

10. **M. Spathandra** *Blume* Mus. Bot. 1: 361—Stapf 605; Gilg l.c. 38; Guill. & Perr. Tent. Fl. Seneg. t. 71, as *Spathandra caerulea* Guill. & Perr. *M. caeruleum* Hook. f.—F.T.A. 2: 461; Chev. Bot. 277. A glabrous shrub or tree, with coriaceous 3-nerved leaves; flowers small, azure-blue, usually abundant; berries black when ripe; generally in damp ravines and swampy forests.
Senegambia. French Guinea: several localities! Sierra Leone: several localities! Liberia: Monrovia! Kakatown! Grand Bassa. Exsicc.—*Afzelius. Perrottet. Heudelot. Don. Whitfield. T. Vogel* 148. *Mann* 827. *Sc. Elliot* 4093. *Whyte. Thomas* 1488; 9258; 9259. *Poëguin* 906.

11. **M. Zenkeri** *Gilg* l.c. 43, t. 10D. A glabrous shrub, with 4-angled branches; flowering nearly all the year.
S. Nigeria: Calabar (Feb.)! Rio del Rey! Also in French Cameroons. Exsicc.—*Mann* 2285. (See Appendix).

12. **M. Bakerianum** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *M. Machairacme* Bak. f. in Cat. Talb. Nig. Pl. 128, not of Gilg. A shrub.
S. Nigeria: Oban! Exsicc.—*Talb.* 203.

FIG. 94.—MEMECYLON SPATHANDRA *Blume* (MELASTOMATACEAE).
A, flowering branch. B, flower. C, stamens. D, calyx with style. E, vertical section of ovary. F, infructescence. G, cross-section of fruit.

13. **M. sessile** *A. Chev.* Bot. 278. A shrub, 6–9 ft high; in forest undergrowth; fruit violet in colour.
Ivory Coast: Sanvi! Between Middle Sassandra and Middle Cavally (July)! Exsicc.—*Chev.* 17836; 19243; 19288.

14. **M. fasciculare** *Naud.*—F.T.A. 2: 463; Gilg l.c. 41; Chev. Bot. 277. *M. cinnamomoides* A. Chev. Bot. 277, not of Gilg. A shrub, about 8 ft.; flowers reddish-blue or whitish; berries black when ripe.
Senegal! French Guinea: several localities! Dalaba (April). Sierra Leone: Freetown! Talla Hills (Feb.)! Bonthe (Feb.)! Exsicc.—*Afzelius. Heudelot* 909. *Don. Sc. Elliot* 4830; 4864; 4916a. *Chev.* 12384; 12407; 12886; 18013; 20295.

15. **M. polyneuron** *Gilg* l.c. 41. A glabrous shrub or tree.
Sierra Leone: Exsicc.—*Afzelius* (not seen).

16. **M. Vogelii** *Naud.*—F.T.A. 2: 462; Gilg l.c. 43; Chev. Bot. 278. A shrub or small tree, 30 ft. or more.
Ivory Coast: Anyama on Potou lagoon (Feb.)! Fernando Po! Also in Princes Isl. Exsicc.—*T. Vogel* 149. *Barter* (no number).

17. **M. membranifolium** *Hook. f.*—F.T.A. 2: 462; Gilg l.c. 41. *M. longicauda* Gilg l.c. t. 10 E. *M. nanum* A. Chev. Bot. 278, name only. A glabrous shrub, 8–10 ft.; flowers red or bluish.
Ivory Coast: several localities! S. Nigeria: Degema! Ambas Bay (Feb.)! Johann-Albrechtshöhe (Dec.)! Fernando Po (Jan.)! Extends to Congo. Exsicc.—*Mann* 8; 191. *Staudt* 471. *Chev.* 17006; 19191; 19501; 21330.

18. **M. Fosteri** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A shrub or small tree.
S. Nigeria: ? locality (Oct.)! Exsicc.—*Foster* 359.

19. **M. cinnamomoides** *Gilg* l.c. 39. A shrub or tree; flowers pale lilac.
Sierra Leone: Ninia, Talla Hills (Feb.)! Magbile (Dec.)! Gold Coast: Ancobra R. (Dec.)! S. Nigeria: Oni, Epe district (May)! Exsicc.—*Afzelius* (not seen). *Sc. Elliot* 4916b. *Johnson* 920. *Thompson* 4. *Thomas* 5918; 6200; 10449.

20. **M. golaense** *Bak. f.* in Journ. Bot. 1911: 320. A glabrous tree, with terete branches and more or less angular branchlets; "petals dark ultramarine colour at base, shading off to white."
Liberia: Gola Forest (April)! Exsicc.—*Bunting.*

65. COMBRETACEAE

Trees or shrubs, often scandent. Leaves opposite, alternate or rarely verticillate, simple, exstipulate. Flowers spicate or racemose, mostly small, hermaphrodite, rarely unisexual. Calyx-tube adnate to the ovary; limb 4–8-fid or -lobed, lobes valvate. Petals 4–5 or none, rarely many, small, imbricate or valvate. Stamens 4–10, rarely more; filaments inflexed in bud; anthers versatile, didymous, opening lengthwise by slits. Disk epigynous. Ovary inferior, rarely half-inferior, 1-celled; style simple; ovules 2–6, suspended from the apex of the ovary by slender funicles. Fruit often winged, rarely dehiscent. Seed pendulous, without endosperm; embryo with convolute, plicate or contorted cotyledons and small radicle.

Mainly tropics and subtropics. Recognised by the exstipulate simple leaves, inferior ovary, and often winged fruits.

Petals present:
- Flowers arranged in spikes or racemes, never in heads:
  - Ovary half-inferior; fruits not winged, succulent and drupaceous; stamens 10, in 2 rows; calyx-tube rather short; leaves alternate .. .. **1. Strephonema**
  - Ovary completely inferior; fruits usually winged:
    - Calyx-tube usually not longer than the ovary; petals mostly small and inconspicuous; fruits usually indehiscent:
      - Petioles without a pair of glands; fruits often winged:
        - Flowers hermaphrodite; fruits usually 4–5-angled or -winged **2. Combretum**
        - Flowers hermaphrodite and male; fruits 2- or rarely 3–4-winged **3. Pteleopsis**
      - Petioles with a pair of glands; fruits ribbed, with a pair of adnate bracteoles; habitat in mangrove-swamps .. .. **4. Laguncularia**
    - Calyx-tube very long; petals large and showy; stamens 10, in two distinct rows; a climbing shrub with opposite leaves; fruits 5–6-winged, at length opening along the wings .. .. **5. Quisqualis**
- Flowers in close often bracteate heads; petals linear; stamens 10, in two rows; leaves opposite or subopposite; whole plant covered with small black glands; petioles without a pair of glands .. .. **6. Guiera**

Petals absent:
- Flowers arranged in spikes or racemes, never in heads; petiole without glands; fruits 2-winged .. .. **7. Terminalia**
- Flowers in close heads; leaves alternate:
  - Stamens 5; petiole with a pair of glands; branchlets slightly winged; habitat in mangrove-swamps .. .. **8. Conocarpus**
  - Stamens 10, in two rows; petiole without glands; branchlets not winged **9. Anogeissus**

1. STREPHONEMA Hook. f.—F.T.A. 2 : 484, under *Lythraceae*.

Leaves elliptic, rounded at the base, shortly acuminate, 12–17 cm. long, up to 7 cm. broad, with about 6 pairs of lateral nerves, glabrous and almost veinless below; inflorescence axillary, very short and subumbellate; pedicels glabrous, about 0·5 cm. long; calyx glabrous .. .. **1.** *Mannii*

Leaves oblong, rounded at the base, acutely acuminate, about 25 cm. long, 6–8 cm. broad, pilose in the axils of the nerves below; lateral nerves 9–11 pairs below, with slender parallel tertiary nerves; inflorescence raceme-like, about 6 cm. long, everywhere brown-tomentose .. .. **2.** *Pseudocola*

1. **S. Mannii** *Hook. f.*—F.T.A. 2 : 484; Engl. & Diels Monogr. Afr. Pfl. 4. Combretac. 1. A glabrous shrub, about 15 ft. high.
S. Nigeria: Old Calabar R. (Feb.)! Also in Gabon. Exsicc.—*Mann* 2293.
2. **S. Pseudocola** *A. Chev.* in Bull. Soc. Bot. Fr., Mém. 8d : 172; Bot. 281. *S. apolloniense* J. J. Clark. A forest tree, up to 70 ft.; fruit 2–3 in. broad, nearly 2 in. long, rough, verrucose, with a long acute beak; seed solitary, with 2 cotyledons somewhat resembling those of the kola nut.
Ivory Coast: several localities! Gold Coast: Nkwanta, West Apollonia (Aug.)! Exsicc.—*Chipp* 232. (See Appendix).

2. COMBRETUM Linn.—F.T.A. 2 : 419.

Stems more or less herbaceous, short, annual, arising from a woody rootstock:
- Leaves glandular or glabrous below, very narrowly lanceolate, acute at both ends, opposite or subverticillate, about 6 cm. long and nearly 1 cm. broad, with about 5 pairs of lateral nerves; flowers appearing with the leaves, in simple inflorescences towards the base of the stems; ovary and calyx slightly pubescent **1.** *bauchiense*

Leaves velvety- or silky-tomentose or reticulate below, linear or elliptic, with an abrupt mucronate point, 5–14 cm. long, 1–5 cm. broad, loosely pilose above ; lateral nerves about 6–7 pairs ; inflorescences mostly axillary, flowers few and crowded at the end of the peduncle ; ovary and calyx tomentose ; petals oblong-ovate, cream-coloured or pinkish, minutely ciliolate at the tip ; fruits almost orbicular, 3–3·5 cm. broad, very shortly pubescent .. .. 2. *herbaceum*

Stems not herbaceous ; much-branched shrubs or trees :

*Inflorescence not branched :

†Leaves glabrous, glandular or scaly below, but not pubescent :

Bracts large and subfoliaceous ; flowers large and distinctly curved ; fruits suborbicular, about 3 cm. in diam. :

Leaves oblong, rounded at the base, acutely acuminate, 10–15 cm. long, 3–6 cm. broad ; calyx not exceeding 2 cm. long above the ovary .. 3. *platypterum*

Leaves ovate or ovate-oblong, more or less cordate at the base, rather obtusely acuminate, 10–15 cm. long, up to 7 cm. broad ; calyx about 3–3·5 cm. long above the ovary .. .. 4. *bracteatum*

Bracts small and not foliaceous ; flowers not curved :

Flowers more or less corymbose in very short dense racemes ; petals pubescent ; petioles often becoming spines :

Petioles scarcely or rarely becoming spines ; leaves elliptic or obovate, very shortly acuminate, rounded or subacute at the base, 7–10 cm. long, 3–5 cm. broad ; calyx slightly pubescent, 1·5 cm. long ; petals oblanceolate, scarlet 5. *constrictum*

Petioles usually becoming spines ; leaves ovate or elliptic, rounded to acutely acuminate at the apex, up to 4·5 cm. long and 3 cm. broad ; calyx about 5 mm. long, rather densely pubescent ; petals obovate-spathulate, creamy-white .. .. 6. *aculeatum*

Flowers in more or less slender racemes or spikes :

Scales on the lower surface of the leaves dense and contiguous or overlapping :

Petioles 3–3·5 cm. long ; leaves ovate-elliptic, shortly acuminate, obtuse at the base, about 15 cm. long and 7 cm. broad, bright yellowish-green below with numerous scales between the veins ; lateral nerves 10–12 pairs ; flowers not seen ; infructescence a little shorter than the leaves ; fruits broadly suborbicular, 3 cm. broad, glandular and tomentellous in the middle 7. *lamprocarpum*

Petioles up to 1·5 cm. long :

Rhachis of inflorescence glabrous or with a few scales ; calyx-tube scaly outside ; leaves elliptic, obtusely and very shortly pointed, rather rounded at the base, 7–10 cm. long, 3–5·5 cm. broad, very densely scaly below ; inflorescence about ½ as long as the leaf .. .. .. 8. *crotonoides*

Rhachis of inflorescence tomentose ; calyx-tube shortly pubescent or tomentose outside ; leaves gradually acuminate :

Calyx-tube shortly and sparingly pubescent outside ; leaves opposite or subopposite, finely reticulate below ; inflorescence in the leaf-axils ; fruits very broadly elliptic, 2·5 cm. long, shortly tomentose towards the middle 9. *collinum*

Calyx-tube tomentose outside ; leaves alternate, faintly reticulate below ; inflorescence supra-axillary ; fruits not seen .. .. 10. *verticillatum*

Scales on the lower surface of the leaves lax, inconspicuous or absent :

Inflorescence terminal ; leaves opposite or subopposite :

Leaves rounded at the apex, elliptic, 7–12 cm. long, 3–6 cm. broad, with about 5 pairs of lateral nerves, not very reticulate ; inflorescence not exceeding the leaves ; flowers whitish ; fruits thick and woody, strongly angled 11. *acutum*

Leaves shortly acuminate, elliptic, about 10 cm. long and 5 cm. broad, with about 5 pairs of lateral nerves, strongly reticulate ; inflorescence much exceeding the leaves ; flowers red .. .. 12. *calobotrys*

Inflorescence axillary :

Leaves submembranous, obscurely reticulate ; fruits glabrous or nearly so between the wings, about 2 cm. broad ; inflorescence small and slender, up to 5 cm. long, slightly lepidote .. .. 13. *lecananthum*

Leaves papery, strongly reticulate, minutely glandular below ; fruits about 2 cm. broad, very sparingly glandular between the wings ; inflorescence similar to preceding .. .. 14. *Elliotii*

Leaves papery, not very strongly reticulate, prominently scaly-glandular below ; fruits up to 1·5 cm. broad, very densely scaly-glandular between the wings ; inflorescence densely scaly and pubescent ; plant usually rust-coloured when dry .. .. 15. *micranthum*

††Leaves pubescent or tomentose at least on the nerves (the hairs sometimes accompanied by glands or scales):

Calyx-tube very long and curved, about 2–2·5 cm. long, densely silky-tomentose; leaves oblong-elliptic, cordate at the base, acutely acuminate, 6–11 cm. long, 3–5 cm. broad, pubescent on the midrib and 5-6 pairs of lateral nerves; inflorescence terminal; bracts lanceolate, long-acuminate; climbing shrub 16. *velutinum*

Calyx-tube straight, not more than 3–4 mm. long:

Climber, with very bristly-hairy branchlets; leaves oblong-lanceolate, rounded or subcordate at the base, acutely acuminate, 8–15 cm. long, 3–5 cm. broad, pubescent on the midrib; inflorescence terminal; flowers red 17. *tarquense*

Trees or shrubs, rarely climbing; branchlets not bristly-hairy; inflorescence usually not terminal:

Leaves rounded and emarginate or mucronate at the apex, oblong or elliptic:

Fruits softly tomentose; leaves scarcely reticulate below but with numerous parallel tertiary nerves; inflorescences usually elongated and much longer than the leaves; petals oblong, mucronate .. .. .. 18. *tomentosum*

Fruits glabrous; leaves distinctly reticulate below; inflorescences not longer than the leaves; petals broadly obcordate .. .. .. 19. *Passargei*

Leaves acute or acuminate or narrowed to the apex:

Leaves ovate, more or less triangular in the upper half, subalternate:

Branchlets scurfy-puberulous; leaves ovate, 10–11 cm. long, 5–6·5 cm. broad, very shortly and densely tomentellous below .. .. 20. *relictum*

Branchlets pilose-pubescent; leaves ovate-elliptic, very acute, up to 15 cm. long and 6 cm. broad, laxly pubescent below and with numerous scales amongst the hairs .. .. 21. *sokodense*

Leaves lanceolate to elliptic or oblanceolate, opposite or subverticillate:

Scales on the lower surface of the youngish leaves very dense and contiguous, much more prominent than the hairs and remaining prominent in the older leaves; fruit-wings subcordate at the base, fruit-body shortly tomentose; leaves subverticillate, 8–15 cm. long, 4–6 cm. broad; petiole about 2 cm. long; inflorescence slender, $\frac{1}{3}$–$\frac{1}{2}$ as long as the leaves .. 10. *verticillatum*

Scales not visible on the younger leaves and never becoming prominent:

Calyx sparingly and laxly pubescent; leaves viscid and shining above, closely tomentose below, oblong-elliptic, rounded and mucronate at the apex, very shortly cuneate at the base, 6–8 cm. long, 3–4·5 cm. broad; petiole scarcely 1 cm. long; inflorescence up to 7 cm. long 22. *glutinosum*

Calyx densely tomentose; leaves not viscid and shining above, closely and softly tomentose below, often becoming finely reticulate; scales evidently not present; lamina lanceolate to elliptic, acute or rounded at the apex, up to 14 cm. long and 8 cm. broad .. .. .. 23. *hypopilinum*

Calyx not known; leaves sparingly and shortly puberulous below, closely reticulate, attenuated from above the middle to the obtuse base, 8–13 cm. long, up to 5 cm. broad; fruits elliptic to ovate, about 2·5 cm. long, almost glabrous .. .. 24. *nigricans*

**Inflorescence branched, often paniculate:

†Flowers yellowish or creamy-white:

Flowers in small globose heads about 1 cm. in diam.; leaves oblong to obovate-elliptic, rounded at the base, shortly acuminate with a mucronate hairy tip, up to 15 cm. long and 7 cm. broad, softly pubescent below, with about 10 pairs of lateral nerves and numerous parallel tertiary nerves; upper leaves whitish; fruits rather small, up to 1·5 cm. long, prominently beaked, laxly pubescent 25. *Zenkeri*

Flowers racemose, spicate or paniculate:

Calyx-tube about 0·5 cm. long above the ovary, narrow; lower flowers opening first, the inflorescence then more or less pyramidal; bracts linear, subpersistent; leaves oblong-elliptic, shortly acuminate, 6–12 cm. long, 3–4·5 cm. broad, with about 6–7 pairs of lateral nerves, slightly pubescent below; fruits broadly elliptic, slightly puberulous, about 3·5 cm. long .. .. 26. *latialatum*

Calyx-tube much shorter above the ovary, usual wide open:

Leaves pubescent below, neither glandular nor scaly, oblong or oblong-oblanceolate, acutely and abruptly acuminate, rounded-obtuse at the base, 6–11 cm. long, 2·5–5 cm. broad, the upper ones gradually becoming smaller and bract-like; inflorescence softly tomentellous, with very numerous flowers 27. *mucronatum*

Leaves glabrous, glandular or scaly below:

Leaves cordate at the base, shortly and obtusely acuminate, oblong-elliptic, 14–16 cm. long, 6–8 cm. broad, with rather numerous glandular scales below; panicle terminal and slender; flowers very small, scaly-pubescent 28. *Mildbraedii*

Leaves rounded to acute at the base :
Leaves distinctly scaly but not glandular below :
Rhachis of inflorescence glabrous or nearly so ; leaves broadly elliptic, not acuminate, 8–15 cm. long, 7–9 cm. broad, the scales below about twice their own diameter apart ; ovary and calyx glabrous, or nearly so ; fruits ovate-acuminate in outline, with 4 hard wings, about 4 cm. long 29. *Afzelii*
Rhachis of inflorescence rusty-tomentellous ; leaves broadly oblong-elliptic, rather abruptly long acuminate, 10–18 cm. long, 5–8 cm. broad, the scales very numerous below and little more than their own diameter apart ; ovary pubescent .. .. 30. *cuspidatum*
Leaves glandular, closely papillose or glabrous below except the midrib :
Midrib of leaves shortly pubescent on the lower surface ; upper part of calyx long-campanulate ; leaves ovate or ovate-elliptic, acutely acuminate, 10–20 cm. long, 4–9 cm. broad, closely papillose below, with about 8 pairs of lateral nerves ; inflorescence rufous-tomentose .. .. 31. *fuscum*
Midrib of leaves glabrous or very finely glandular below :
Leaves rounded at the base, rather abruptly acuminate at the apex :
Inflorescence much exceeding the leaves ; flowers rather lax and interrupted :
Leaves broadly ovate, 10–16 cm. long, 6–9 cm. broad, obscurely glandular below, with rather prominent parallel tertiary nerves 32. *homalioides*
Leaves elliptic, 8–11 cm. long, 4·5–5·5 cm. broad, glabrous below, with rather obscure reticulate tertiary nerves .. .. 33. *obanense*
Inflorescence much shorter than the leaves ; flowers very crowded, with glabrescent calyx ; leaves broadly elliptic, 12–16 cm. long, 7–9 cm. broad, closely viscid-glandular below .. .. 34. *insulare*
Leaves acute at the base, triangular or tapered to the apex :
Rhachis of inflorescence and calyx viscid, not or only slightly pubescent ; leaves acutely acuminate, often viscid and not conspicuously reticulate 35. *Dalzielii*
Rhachis of inflorescence and calyx softly tomentose ; leaves not or only slightly acuminate, closely and finely reticulate .. 36. *ghasalense*

††Flowers red or pink :
Calyx-tube about 2 cm. long, obconic, glabrous, lobes shortly pubescent on the margin ; petals large, oblanceolate, about 1·5 cm. long, almost glabrous, veiny ; leaves obovate-elliptic, rather abruptly acuminate, rounded or subcordate at the base, up to 15 cm. long and 6 cm. broad, mostly pubescent on the nerves below ; fruit thin, broadly elliptic, 3·5 cm. long, glabrous 37. *grandiflorum*
Calyx-tube up to 1 cm. long ; petals usually much shorter than the preceding :
Bracts large and coloured (white or pink), graduating from the leaves ; flowers subumbellate at the ends of the lateral branchlets ; leaves elliptic to ovate, acute, 5–10 cm. long, 3–5 cm. broad, slightly pubescent on the nerves ; stamens long-exserted ; ovary pubescent :
Upper part of calyx glabrous .. .. 38. *racemosum*
Upper part of calyx shortly pubescent .. .. .. 39. *cinereopetalum*
Bracts sharply differentiated from the upper leaves, or if not then comparatively small and inconspicuous :
Subtending bracts as long or nearly as long as the flowers, more or less persistent ; leaves mostly cordate at the base :
Subtending bracts ovate or ovate-lanceolate, leafy, very acutely acuminate, about 2 cm. long and 1 cm. broad, villous ; leaves oblong or elliptic, acutely acuminate, up to 12 cm. long and 6 cm. broad, at first softly tomentellous below ; calyx with long tapering lobes ; fruits broader than long, 2·5–3 cm. broad, with thin membranous softly pubescent wings .. 40. *dolichopetalum*
Subtending bracts linear or linear-lanceolate, acute, about 1 cm. long, slightly pubescent ; leaves elliptic-obovate, shortly obtusely acuminate, up to 15 cm. long and 7 cm. broad, nearly glabrous below ; calyx with short triangular lobes ; fruits suborbicular, 2·5 cm. diam., with membranous puberulous wings .. .. 41. *comosum*
Subtending bracts very small and deciduous :
Calyx-tube rather densely tomentose, constricted in the middle ; leaves oblong-elliptic, rounded at the base, emarginate and conspicuously mucronate at the apex, 8–12 cm. long, 4–5 cm. broad, strongly reticulate and pubescent below ; petiole 1·5–2·5 cm. long .. .. 42. *Lecardii*
Calyx-tube not or only slightly constricted in the middle, sparingly and shortly pubescent :
Leaves subsessile, cordate at the base, ovate-elliptic, acutely acuminate, 10–15 cm. long, 5–7 cm. broad, rusty-pilose on the nerves below ; panicle small, terminal ; rhachis very villous .. .. 43. *Mannii*

Leaves petiolate, rounded at the base :
Calyx-teeth and petals 5 ; panicles small ; branchlets glabrous or nearly so ; leaves more or less obovate-elliptic, acuminate .. .. .. 44. *confertum*
Calyx-teeth and petals 4 ; panicles very large ; branchlets pubescent ; leaves broadly elliptic or nearly orbicular, often softly pubescent when young 45. *paniculatum*

1. **Combretum bauchiense** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. Annual stems 1–3 ft. high, appearing after burning.
N. Nigeria : Bauchi Plateau, Vom, 3,000–4,000 ft. Exsicc.—*Dent Young* 92.

2. **C. herbaceum** *G. Don*—F.T.A. 2 : 433 ; Chev. Bot. 262 ; Engl. & Diels Monogr. Afr. Pfl. 3. Combretac. 67. Annual stems like the preceding ; flowers creamy-yellowish or sometimes pinkish ; wings of fruit thin, papery, often pink in colour ; yields a gum.
French Guinea : Kollangui (fr. April) ! ? locality ! Sierra Leone : Makunde (April) ! Wallia, R. Scarcies (Feb.) ! Tumbu (May) ! Gold Coast : Northern Territories, Salaga ! N. Nigeria : common in grass-savannah and rocky ground (fl. Feb., Mar.) ! Also in Shari-Chad. Exsicc.—*Afzelius*. *Don*. *Barter* 793 ; 1682. *Sc. Elliot* 4283 ; 5709a ; 5710. *Farmar* 277. *Elliott* 21 ; 29. *Chev.* 319 : 12884. (See Appendix).

3. **C. platypterum** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *Cacoucia platyptera* Welw. *Cacoucia villosa* Laws., partly. *Cacoucia paniculata* Laws., not *Combretum paniculatum* Vent. *Cacoucia Barteri* Hemsl. *Combretum Lawsonianum* Engl. & Diels. *Campylochiton platypterus* Hiern. A climbing shrub, with showy red flowers ; fruit-wings sometimes reddish.
Sierra Leone : several localities (Jan., Feb., July, Aug.) ! Ivory Coast : Bingerville ; Abidjean (Dec.). Gold Coast : Akwapim (April) ! S. Nigeria : many localities (Jan., Mar.) ! Extends to Angola, Belgian Congo and Upper Nile Land. Exsicc.—*Barter* 1657. *Sc. Elliot* 4710. *Smythe* 73. *Holland* 97 ; 199. *Millson* 34. (See Appendix).

4. **C. bracteatum** *Engl. & Diels* Monogr. Afr. Pfl. 3. Combretac. 100, t. 29 B., excl. syn. *Cacoucia platyptera* Welw. and *Campylochiton platypterus* Hiern—Holl. 2 : 310. *Cacoucia platyptera* Hemsl. in Hook. Ic. Pl. t. 2549, not of Welw. *Cacoucia splendens* Hemsl. l.c. t. 2548. *Cacoucia bracteata* Laws., partly (excl. Welwitsch specimen). A climbing shrub ; flowers yellow to orange-red ; bracts reddish-yellow.
S. Nigeria : Calabar (Jan.) ! Oban ! Cameroons River (Jan.) ! Victoria (Feb.) ! Johann-Albrechtshöhe (Jan.) ! Barombi (April). Also in French Cameroons and Angola. Exsicc.—*Barter* 2057. *Mann* 158 ; 2208. *Holland* 12. *Kalbreyer* 42. *Preuss* 1320. *Staudt* 527.

5. **C. constrictum** *Laws.*—F.T.A. 2 : 423. Usually a low shrub, erect or scrambling ; leaves alternate or often opposite or sometimes in whorls of 3 ; flowers crowded, scarlet, often at the ends of short branches near the ground ; common in damp situations.
N. Nigeria : Benue R. (Oct.) ! Abinsi (Mar.) ! Yola (Jan.) ! Gurara R. (July) ! Gbebe, Bassa Prov. (June) ! S. Nigeria : Idah (Sept.) ! Ibo country (Aug.) ! Onitsha ! Idua, Calabar R. (Sept.) ! Lagos ! Also in East Africa. Exsicc.—*T. Vogel* 39 ; 42 ; 207. *Barter* 1303. *Elliott* 183 ; 241. *Dalz.* 191 ; 705. (See Appendix).

6. **C. aculeatum** *Vent.*—Guill. & Perr. Tent. Fl. Seneg. t. 66, as *Poivrea aculeata* DC. ; F.T.A. 2 : 423 ; Chev. Bot. 260. A shrub, 10–15 ft., often with lax branches or scandent ; flowers whitish ; in comparatively dry regions.
Mauritania : Adrar. French Sudan : several localities (July) ! Senegal : ? localities ! Thiès (Dec.). Sounsoun (May–June). N. Nigeria : Bornu (April) ! Yola (Dec.) ! Sokoto (fl. and fr. July) ! Kori (Mar.) ! Mutwe (fr. Dec.) ! Extends to Abyssinia and Somaliland, Upper Nile and Tanganyika. Exsicc.—*Heudelot* (? number). *E. Vogel* 81. *Farmar* 104. *Dalz.* 93 ; 430. *Foster* 2 ; 74. (See Appendix).

7. **C. lamprocarpum** *Diels* in Engl. Bot. Jahrb. 39 : 500. A small tree, in open savannah.
Gold Coast : Abetifi (fr. June) ! Ashanti, Dukwesein (fr. Dec.) ! Togo : Amlame (fr. Dec.) ! S. Nigeria : Lagos Colony ! Exsicc.—*Thompson* 84. *Chipp* 607. *Dawodu* 138. *Busse* 3548.

8. **C. crotonoides** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. Leaves very like a *Croton*, pale with numerous scales below.
Senegal : ? locality ! Exsicc.—*Heudelot* 187.

9. **C. collinum** *Fres.*—F.T.A. 2 : 427. A small tree.
N. Nigeria : Nupe ! Extends to Eastern Sudan, Uganda and Abyssinia. Exsicc.—*Barter* (no number).

10. **C. verticillatum** *Engl.* (× *Engl. & Diels* l.c. 52. *C. geitonophyllum* and *C. hypopilinum*, both of A. Chev. Bot. 262, not of Diels. A shrub or small tree, common in bush-savannah.
French Sudan : Balandougou (Feb.) ! Dahomey : between Agouagon and Savé (May) ! N. Nigeria : Kontagora (Jan.) ! Katagum ! Sokoto ! Extends to Eastern Sudan. Exsicc.—*Dalz.* 113 ; 429. *Lely* 842a. *Chev.* 323 ; 23561. (See Appendix).

11. **C. acutum** *Laws.*—F.T.A 2 : 424. A shrub, about 10 ft., erect or scrambling ; flowers whitish ; young branches purplish ; fruit not winged ; in muddy places and by streams.
N. Nigeria : Lokoja ! Abinsi (June) ! Exsicc.—*Barter* 453 ; 1671. *Dalz.* 706.

12. **C. calobotrys** *Engl. & Diels* l.c. 73. A climbing shrub, with lax branches.
Liberia : Kakatown ! Grand Bassa (Nov.) ! Exsicc.—*Dinklage* 1775 ; 1862.

13. **C. lecananthum** *Engl. & Diels* l.c. 42. A small tree, up to 20 ft.
French Guinea : ? locality ! Sierra Leone : Falaba, Berria (Feb., Mar.) ! N. Nigeria : Sokoto (April, May) ! Also in Ubangi-Shari-Chad and Eastern Sudan. Exsicc.—*Sc. Elliot* 4971 ; 4999 ; 5212. *Farmar* 254. *Ryan* 32 ; 61. *Lely* 823. (See Appendix).

14. **C. Elliotii** *Engl. & Diels* l.c. 42—Chev. Bot. 261, incl. var. *imberbe* A. Chev. A small tree, up to 30 ft. or more ; young leaves more or less glutinous.
French Sudan : Koulikoro (Oct.) ! Senegal : Casamance ! French Guinea : Farana (fr. Jan., Mar.) ! Sierra Leone : Erimakuna (fr. Mar.) ! Ivory Coast : several localities ! Togo : Basari (April) ! N. Nigeria : Sokoto (fr. Dec.) ! S. Nigeria : Oloke Meji. Also in Ubangi-Shari-Chad. Exsicc.—*Sc. Elliot* 5251 ; 5363. *Dalz.* 435 ; 539. *Foster* 309. *Kersting* 271A. *Chev.* 22206.

15. **C. micranthum** *G. Don*—F.T.A. 2 : 428, and Chev. Bot. 260, as *C. altum* Perr. ; Holl. 2 : 311. *C. floribundum* Engl. & Diels—Chev. Bot. 261. A small tree, up to 20 ft.
French Sudan : Faragaran (Mar.) ! Gourma (July) ! Fo (June) ! San (Sept.) ! Sansanding (Sept.) ! Senegal : several localities ! Gambia ! French Guinea : numerous localities (fl. Feb.–Mar.) ! Sierra Leone : Scarcies R., Kukuna (Jan.) ! " very common on laterite hills." ! N. Nigeria : various localities, in bushland, sandy or laterite hills, often forming thickets, usually flowering April–May ! Exsicc.—*Heudelot* 123 ; 284 ; 812. *Sieber* 25. *Thierry* 1 ; 24. *Sc. Elliot* 4702a ; 4753 ; 5915. *Barter* 1645 ; 1711. *Dalz.* 326 ; 429. *Lely* 821 ; 822. *Foster* 29. *Ryan* 30 ; 59. *Chev.* 665 ; 958 ; 2145 ; 2146 ; 2147 ; 12678 ; 13559. (See Appendix).

16. **C. velutinum** *Engl. & Diels* l.c. 100. *Cacoucia coccinea* Laws.—F.T.A. 2 : 434, not of Aubl. *C. velutina* S. Moore. A climbing shrub ; flowers in large erect racemes, fuscous-tomentose ; petals red.
Sierra Leone : Bagroo R. (April) ! Exsicc.—*Mann* 856.

17. **C. tarquense** *J. J. Clark* in Kew Bull. 1913 : 76. A climbing shrub ; flowers red in a terminal spike.
Gold Coast : Tarkwa (Feb.) ! Suku Suku (Nov.) ! Exsicc.—*Thompson* 43. *Chipp* 10.

18. **Combretum tomentosum** *G. Don*—F.T.A. 2 : 430 ; Chev. Bot. 265. A tall climbing shrub, with pale rusty-villous branchlets ; flowers greenish-white.
French Sudan : near Bamako, 900 ft. (Jan.) ! Sangarala (Feb.). Siguiri, etc., Senegal : ? locality ! Casamance (Jan., Feb.). French Guinea : Farana, 3,500 ft. (fr. Mar.) ! Futa Jallon (Mar., April). Timbo (Dec.). Sierra Leone : Scarcies R., Kukuna (Jan.) ! Exsicc.—*Heudelot* 379. *Sc. Elliot* 4666 ; 5364.

19. **C. Passargei** *Engl. & Diels* l.c. 45. A small tree, up to 20 ft., hoary or rufous-tomentose.
N. Nigeria : Musgu (fr. April) ! Katagum (Jan.) ! Garu ! Adamawa (Jan.) ; abundant in Bornu, "from 11° N. northwards." Exsicc.—*E. Vogel* 82. *Dalz.* 331 ; 426B. *Foster* 22.

20. **C. relictum** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A shrub or tree, with angular branches.
Senegal ! Exsicc.—*Heudelot* 747.

21. **C. sokodense** *Engl.* Bot. Jahrb. 39 : 498—Chev. Bot. 264 ; Holl. 2 : 310, as *C. leonense* Engl. & Diels. A tree, up to 20–30 ft., common in open bush-savannah.
Togo : Sokode (fl. and fr. May) ! between Sokode and Basari (fr. Nov.). Dahomey : Atacora Mts. (June) ! N. Nigeria : Sokoto (Dec.) ! Katagum ! Yola (April) ! S. Nigeria : Lagos Colony ! Also in Ubangi-Shari-Chad. Exsicc.—*Dalz.* 92 ; 347 ; 437. *Foster* 43. *Kersting* 86 ; 485. (See Appendix).

22. **C. glutinosum** *Perr.*—F.T.A. 2 : 432 ; Guill. & Perr. Tent. Fl. Seneg. t. 68 ; Holl. 2 : 310 ; Chev. Bot 262. A shrub, up to 15–18 ft. high.
French Sudan : Dougoura (Feb.) ; Diapaga (July). Senegal : ? locality ! Sierra Leone : Scarcies R., Buyabuya (fr. Feb.) ! Also in Shari-Chad region. Exsicc.—*Heudelot* 336. *Sc. Elliot* 4775. (See Appendix).

23. **C. hypopilinum** *Diels* in Engl. Bot. Jahrb. 39 : 497. A tree, 25–40 ft. high, with cream-coloured flowers; in open savannah.
Gold Coast : Northern Territories, Zouaragou (April) ! N. Nigeria : Nupe ! Sokoto (Feb., Dec.) ! Abinsi (Feb.) ! Bauchi ! Mutwe (Dec.) ! Musgu (May) ! Also in Shari-Chad. Exsicc.—*E. Vogel* 69. *Barter* 737 ; 1113 ; 1179 ; 1192 ; 1204. *Dalz.* 431–2 ; 698 ; 777. *Lely* 801 ; 842.

24. **C. nigricans** *Lepr.*—F.T.A. 2 : 431. A small tree.
Senegal : Bakel (fr. Aug.) Banks of R. Gambia ! Exsicc.—*Heudelot* 112. *Dawe* 48.

25. **C. Zenkeri** *Engl. & Diels* l.c. 66—Holl. 2 : 311. A climbing shrub, with the upper leaves on the flowering branches pale-whitish.
Gold Coast : Afram Plains (fr. Jan.) ! Nsawam (Oct) ! Togo : near Lome ! S. Nigeria : Lagos Colony ! Abeokuta ! Oni R. ! Oloke Meji ! Oban ! Also in Cameroons. Exsicc.—*Chipp* 597. *Dalz.* 98. *Foster* 180. *Irving* 18. *Millen* 52. *Talb.* 1373. *Warnecke* 449. (See Appendix).

26. **C. latialatum** *Engl.* ex *Engl. & Diels* l.c. 86. A climbing shrub, the leafy bracts of the inflorescence pale.
S. Nigeria : between Victoria and Bimbia (Aug.) ! Also in French Cameroons and Spanish Guinea. Exsicc.—*Preuss* 1322.

27. **C. mucronatum** *Schum. & Thonn.*—F.T.A. 2 : 426 ; Holl. 2 : 311 ; Chev. Bot. 263. A climbing shrub ; fruit comparatively small, about ½ in. long and slightly broader.
Fairly abundant throughout the area from Senegal to S. Nigeria. Also in Cameroons, Spanish Guinea, and Ubangi region. (See Appendix).

28. **C. Mildbraedii** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A shrub or tree.
French Guinea : Timbo, Kouria and environs (Nov.) ! Togo : Misahöhe (Nov.) ! Exsicc.—*Mildbraed* 7305. *Caille* 14792.

29. **C. Afzelii** *Engl. & Diels* l.c. 22. *C. conchipetalum* Engl. & Diels. A climbing shrub of river-bank or marshy forest, with an abundant inflorescence of small white sweet-scented flowers.
Sierra Leone : ? locality. Gold Coast : Tano R. (Sept.) ! S. Nigeria : Iddo Isl. (Oct.) ! Also in Cameroons. Exsicc.—*Afzelius. Millen* 7. *Chipp* 343.

30. **C. cuspidatum** *Planch.*—F.T.A. 2 : 426. A climbing shrub ; petals white.
Sierra Leone : Freetown (June) ! Fernando Po (June) ! Exsicc.—*Afzelius. T. Vogel* 47. *Mann* 410.

31. **C. fuscum** *Planch.*—F.T.A. 2 : 426. A climbing shrub ; young branches and flowers covered with soft brownish pubescence, drying blackish.
Sierra Leone : Freetown (June) ! Between Bafodeya and Lokko (April) ! Liberia : Grand Bassa ! S. Nigeria : Lagos ! Cameroons Mt. (Jan.) ! Exsicc.—*Afzelius. T. Vogel* 127. *Ansell* (no number). *Millen* 156. *Dinklage* 1673. *Dunlap* 13.

32. **C. homalioides** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. "A tree, 60 ft. ; flowers white, scenting the whole forest."
S. Nigeria : Onitsha ! Exsicc.—*Barter* 1803.

33. **C. obanense** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A shrub or small tree, with coriaceous leaves.
S. Nigeria : Oban, Obutong Road ! Exsicc.—*Talb.* 1676.

34. **C. insulare** *Engl. & Diels* l.c. 21. A lofty climber.
Fernando Po ! Exsicc.—*Mann* 1156.

35. **C. Dalzielii** *Hutch.* in Kew Bull. 1927, ined. A smooth-leaved tree, yielding gum ; flowering mostly on branches from which the leaves have fallen.
Gold Coast : Northern Territories, Daboiya ! Tachale ! N. Nigeria : Katagum (Dec.) ! Mutwe (Dec.) ! Exsicc.—*Dalz.* 221. *Elliott* 167. *Dudgeon* 102. *Foster* 76. (See Appendix).

36. **C. ghasalense** *Engl. & Diels* l.c. 47. *C. Kerstingii* Engl. & Diels. *C. basarense* Engl. *C. Zechii* Diels. *C. Augustinum* A. Chev. Bot. 260, not of Diels. A tree, like the preceding.
Abundant in the savannah regions of the hinterland from French Guinea and S. Leone to N. Nigeria. Also in the Nile Region. Exsicc.—*Sc. Elliot* 4963 ; 4966. *Thompson* 65. *Chipp* 637 ; 826. *Elliott* 21. *Dalz.* 112 ; 426A ; 436 ; 911. *Kersting* 38a ; 228 ; 264 ; 435. *Busse* 3572. *Chev.* 190 ; 24803. (See Appendix).

37. **C. grandiflorum** *G. Don*—F.T.A. 2 : 423 ; Chev. Bot. 262. A climbing shrub ; flowers in dense one-sided spikes, showy deep-red with a funnel-shaped calyx.
French Guinea : Konakry (Feb.) ; near Konkouré (Oct.). Sierra Leone : common about Freetown and in the bush (June, Dec.) ! Sukudu (July–Aug.) ! Liberia : Monrovia (fr. July) ! Kakatown ! Grand Bassa ! Cape Palmas. Ivory Coast : Yapo (Oct.) ! Bingerville : Trépos country (July). Gold Coast : Tarkwa (Sept.) ! Exsicc.—*Afzelius. Sc. Elliot* 4081 ; 5152. *T. Vogel* (no number). *Dawe* 550. *Dalz.* 99. *Dinklage* 1756. (See Appendix).

38. **C. racemosum** *P. Beauv.*—Guill. & Perr. Tent. Fl. Seneg. t. 67 ; F.T.A. 2 : 424 ; Chev. Bot. 264. A climbing shrub ; flowers red in abundant clusters ; bracts and upper leaves white, often turning pink or purple.
Abundant throughout the area from Senegal to Cameroons and Fernando Po, in the forest regions, or at the edge of thickets and on river-banks in the open country. Extends to Eastern Sudan, and to Congo, Angola and Central Lakes district. (See Appendix).

39. **C. cinereopetalum** *Engl. & Diels* l.c. 84. Very similar to the preceding species.
Cameroons Mt. : Buea (Jan.). Extends to Angola and Upper Congo. Exsicc.—*Lehmbach* 136.

40. **C. dolichopetalum** *Engl. & Diels* l.c. 91. *C. Lawsonianum* A. Chev. Bot. 263, not of Engl. & Diels. *Cacoucia villosa* Laws. A climbing shrub ; flowers usually pinkish.
French Guinea : ? locality ! Sierra Leone : ? locality ! Ivory Coast : Bingerville and Abidjean (Dec.) ! Gold Coast : Tano River (fl. and fr. Sept.) ! S. Nigeria : several localities in the south (fl. and fr. Dec.–Feb.) ! Rio del Rey ! Exsicc.—*Afzelius. Mann* 2296. *Thomson* 14. *Talb.* 3004. *Chev.* 17289 ; 17323–4.

41. **Combretum comosum** *G. Don*—F.T.A. 2 : 421 ; Chev. Bot. 261. A climbing shrub, with ample panicles of pink or bright red flowers ; leaves often 3 in a whorl.
Senegal : ? locality ! French Guinea : Kala to Diaguissa (April) ; Irébéléya (Dec.). Sierra Leone : abundant about Freetown and in several other localities (fl. and fr. Jan., Feb.) ! Liberia : Kakatown ! Gold Coast : Tarkwa (Dec.) ! Tuapem (Nov.) ! Also in Upper Ubangi and Nile Land. Exsicc.— *Afzelius. Heudelot* 80. *Mann* 886. *Smythe* 50 ; 107. *Sc. Elliot* 4443 ; 5785. (See Appendix).

42. **C. Lecardii** *Engl. & Diels* l.c. 73—Chev. Bot. 263 (excl. No. 24663). A shrub, probably a climber, with softly pilose branchlets.
French Sudan : Dio (Jan.) ! Bamako on laterite plateaux (Jan.) ! Upper Senegal ! Sierra Leone Exsicc.— *Lecard* 12. *Chev.* 167 ; 240.

43. **C. Mannii** *Laws.* ex *Engl. & Diels* l.c. 74. *C. Klotzschii* Welw., partly. A climbing shrub with densely rusty-pilose branchlets.
S. Nigeria : Cameroons River (Jan.) ! Exsicc.—*Mann* 725.

44. **C. confertum** *Laws.*—F.T.A. 2 : 422. A glabrous twining shrub.
S. Nigeria : Oban ! Johann-Albrechtshöhe. Fernando Po (Dec.) ! Also in the Belgian Congo. Exsicc. —*T. Vogel* 256.

45. **C. paniculatum** *Vent.*—F.T.A. 2 : 425 ; Chev. Bot. 263. *C. ramosissimum* Engl. & Diels. A shrub, usually climbing, with scarlet fascicled flowers in conspicuous terminal panicles.
Throughout the area from Senegal to N. and S. Nigeria, Cameroons and Fernando Po. Extending to Princes Isl., Angola, Eastern Sudan and East Africa. (See Appendix).

Imperfectly known Species.

C. leonense *Engl. & Diels* l.c. 51.
Sierra Leone : between Wallia and Buyabuya, Scarcies (fr. Feb.) ! Exsicc.—*Sc. Elliot* 4772.
This is very near *C. sokodense* Engl., but as the flowers are not yet known we cannot place the species in the key.

3. PTELEOPSIS Engl.—Engl. & Diels Monogr. Afr. Pfl. 4. Combretac. 2.

A small tree ; leaves ovate- or oblong-elliptic or narrowly oblong, acuminate, narrowed at the base, 4–11 cm. long, 2–4 cm. broad, thinly pilose below ; lateral nerves 6–8 pairs ; petiole 0·5–1·5 cm. long ; flowers subumbellate ; pedicels about 2 mm. long, sparingly pubescent ; calyx shallowly 4-lobed, pubescent ; petals obovate, clawed ; fruits 4-winged, broadly obovate, about 1·5–2 cm. long, on slender pedicels *suberosa*

P. suberosa *Engl. & Diels* in Engl. Bot. Jahrb. 39 : 509—Chev. Bot. 265. *P. Kerstingii* Gilg. A tree, 30 ft. or more, in open forests.
French Sudan : Balani (fr. Jan.). Gold Coast : Wiowoso, West Ashanti (Feb.) ! Togo : Sokodé-Basari (fr. Nov.). Also in the Chad area. Exsicc.—*Chipp* 104. *Chev.* 143. *Kersting* 315 ; 486.

4. LAGUNCULARIA Gaertn.—F.T.A. 2 : 419.

A small tree ; branchlets glabrous ; leaves opposite, petiolate, obovate or elliptic, rounded and mucronate at the apex, 6–10 cm. long, 4–5 cm. broad, glabrous, with several slightly recurved lateral nerves ; petiole with a pair of glands towards the top ; flowers subpaniculate, sessile on the axis ; bracts deciduous, ovate ; axis puberulous ; bracteoles adnate to the calyx-tube ; fruits shortly club-shaped, ribbed, about 2 cm. long, shortly pubescent .. .. *racemosa*

L. racemosa *Gaertn.*—F.T.A. 2 : 419 ; Engl. & Diels Monogr. Afr. Pfl. 4. Combretac. 33, fig. 5 ; Holl. 2 : 309.
Growing in mangrove-swamps on the coasts of tropical America and West Africa. Senegal : Carabane (Jan.). Sierra Leone : Wellington (Mar.) ! Waterloo (June) ! Liberia : Grand Bassa (July) ! Gold Coast : ? locality ! Bushua (April) ! S. Nigeria : Nun R. ! Lagos ! Brass (Dec.) ! Fernando Po (Nov.) ! Also in Angola. Exsicc.— *Kirk* 46. *T. Vogel* 52 ; 110 ; 197. (See Appendix).

5. QUISQUALIS Linn.—F.T.A. 2 : 435.

A scandent shrub ; young branchlets pubescent ; leaves opposite, with persistent indurated petioles, obovate-elliptic, rounded at the base, shortly acutely acuminate at the apex, up to about 10 cm. long and 5 cm. broad, glabrous or slightly pubescent ; flowers in terminal often bracteate spikes ; calyx-tube elongated, about 6–7 cm. long, glabrous or shortly pubescent ; lobes variable, sometimes acutely acuminate ; petals oblong-elliptic, about 1·5 cm. long ; fruits mostly 5-winged, oblanceolate in outline, about 3 cm. long .. .. *indica*

Q. indica *Linn.*—F.T.A. 2 : 435 ; Engl. & Diels Monogr. Afr. Pfl. 4. Combretac. 5, fig. 3 ; Holl. 2 : 312 ; Chev. Bot. 265. Petals often white outside and red inside, or turning entirely red.
French Sudan : Ouagadougou (Aug.). Ivory Coast : Assinie (April) ; Alepe (Feb.) ; Malamalaso (Mar.). Gold Coast : Kratchi ! ? locality ! Dahomey : Zagnanado (Feb.). Nigeria : common on river banks in both Northern and Southern Provinces ! Cameroons R. (Jan., June) ! Between Victoria and Bimbia (April, May, Aug.). Also in Gabon, Nyasaland, etc. Apparently common to Asia and Africa. Exsicc.—*T. Vogel* 42, 96. *Mann* 20 ; 426 ; 2212 ; 2289. *Thomson* 3. *Barter* 1118. *Elliott* 216. (See Appendix).

6. GUIERA Adans.—F.T.A. 2 : 418.

A small shrub, with scattered black dots ; branchlets softly tomentellous ; leaves opposite or subopposite, oblong-elliptic, rounded or slightly cordate at the base, mucronate at the apex, 3–5 cm. long, 1·5–3 cm. broad, softly tomentose on both surfaces with scattered black glands below ; petiole without a pair of glands : flowers in dense shortly pedunculate involucrate heads, the latter about 1 cm. in diam. ; bracts enclosing the flowers in bud, ovate, about 7 mm. long ; petals very narrow ;

FIG. 95.—GUIERA SENEGALENSIS *Lam.* (COMBRETACEAE).

A, flower partly laid open. B, C, stamens, front and back. D, cross-section of ovary. E, vertical section of ovary.

fruits linear, radiating, 3–4 cm. long, crowned by the persistent perianth, densely silky-villous .. .. *senegalensis*

Guiera senegalensis *Lam.*—Guill. & Perr. Tent. Fl. Seneg. t. 66, fig. 2 : F.T.A. 2 : 418 ; Engl. & Diels Monogr. Afr. Pfl. 4. Combretac. 2, fig. 2 ; Chev. Bot. 259. Grey foliage and yellowish flowers.
Abundant in sandy wastes and semi-desert areas of the north. Extending from Senegal across to the Eastern Sudan. (See Appendix).

7. TERMINALIA Linn.—F.T.A. 2 : 415.

Leaves glabrous below, except when quite young :
Calyx-tube glabrous ; fruit (so far as known) glabrous :
Leaves broadly obovate-elliptic, long-petiolate, rounded to a subacute unequal-sided base, shortly and obtusely apiculate, finely reticulate below ; lateral nerves about 7 pairs, ascending ; petiole 2·5 cm. long ; fruit broadly elliptic ; stipe about 0·5 cm. long ; wings about 8 mm. broad .. .. 1. *Brownii*
Leaves more or less elongate-oblong-elliptic or oblong ; fruits oblong or lanceolate :
Fruits acute at both ends, beaked at the apex, lanceolate in outline, about 6 cm. long and 2·5 cm. broad (see fig. 96 C) ; leaves of the young barren shoots sparingly pubescent on the nerves, those of the flowering shoots glabrous ; inflorescences up to 14 cm. long, slightly pubescent .. .. 2. *laxiflora*
Fruits rounded or emarginate at the apex, oblong :
Leaves more or less obovate, attenuated to the base and sometimes subsessile ; fruit large, 8–12 cm. long, 3–3·5 cm. broad, the body acute at both ends ; inflorescence slightly pubescent ; calyx glabrous .. .. 3. *macroptera*
Leaves elongate-oblong, shortly narrowed to the base ; fruit up to 5 cm. long and 2·5 cm. broad, emarginate and slightly mucronate at the apex ; flowers not seen .. .. 4. *sokodensis*
Calyx-tube pubescent or tomentose ; fruits usually pubescent :
Fruits broader than long :
Fruits rhomboid, 2·5 cm. long, 3·5 cm. broad ; ovary densely rusty-tomentose ; leaves subverticillate, obovate, subacute, 7–14 cm. long, 4–6 cm. broad, slightly pubescent mainly on the nerves below, often very densely so when young 5. *scutifera*
Fruits transversely oblong, about 2 cm. long and 5 cm. broad, becoming glabrous ; ovary shortly tomentellous ; leaves crowded, long-petiolate, obovate, subacute, 10–17 cm. long, 6–10 cm. broad, glabrous .. .. .. 6. *superba*
Fruits longer than broad :
Leaves obovate, narrowed from above the middle to the base, abruptly and shortly acuminate, 7–12 cm. long, 3–5 cm. broad, almost glabrous, with very prominent lateral nerves ; fruits oblong, emarginate, 7–8 cm. long, 2 cm. broad, finely puberulous ; flower-buds apiculate .. .. 7. *ivorensis*
Leaves more or less elliptic, rounded at the base or rarely cuneate, obtuse or acute at the apex, up to 15 cm. long and 8 cm. broad, finely reticulate below, usually puberulous ; flower-buds silky-pubescent, apiculate ; ovary long, tomentose ; fruits oblong, about 7 cm. long, 2·5 cm. broad, softly tomentellous 8. *glaucescens*
Leaves more or less pubescent or tomentose below :
Leaves pubescent only on the nerves below :
Leaves up to 15 cm. long and 8 cm. broad :
Fruits broader than long (fig. 96 A) ; other characters as above 5. *scutifera*
Fruits much longer than broad (fig. 96 C,E) :
Fruits acute at the apex ; other characters as above .. .. 2. *laxiflora*
Fruits rounded and emarginate at the apex ; other characters as above 8. *glaucescens*
Leaves very large, about 30 cm. long and 18 cm. broad, elliptic, closely reticulate and pubescent on the nerves below ; fruits elliptic-oblong, emarginate, 7–9 cm. long, 2·5–3 cm. broad, shortly pubescent .. .. 9. *Kerstingii*
Leaves tomentose or silky all over the lower surface :
Leaves closely appressed-silky below, silvery, lanceolate or elliptic, acute, 7–10 cm. long, 3–4·5 cm. broad ; flowers rather dense, closely silky-tomentose ; flower-buds subacute ; fruits not seen .. .. 10. *albida*
Leaves more or less loosely tomentose on both surfaces :
Leaves elongate-oblong or oblong-elliptic, obtuse at the apex, unequally rounded at the base, up to 18 cm. long and 6 cm. broad ; fruits lanceolate-elliptic, subacute at each end, 5–6 cm. long, 2–2·5 cm. broad, softly tomentellous 11. *avicennioides*
Leaves broadly obovate or obovate-elliptic, 20–35 cm. long, about 15 cm. broad, strongly reticulate below, covered with curled hairs ; fruits 8–9 cm. long, 4 cm. broad, the body ellipsoid, 3–3·5 cm. long, softly tomentellous 12. *reticulata*

1. **T. Brownii** *Fres.*—F.T.A. 2 : 415. A small tree, up to 30–40 ft. ; leaves somewhat crowded at the ends of the branches ; fruit purple-red, somewhat glaucous.
N. Nigeria : on hills in Kilba country, Yola Prov. (fr. July) ! Extends to Abyssinia and Somaliland, Angola, Uganda and East Africa. Exsicc.—*Dalz.* 94.

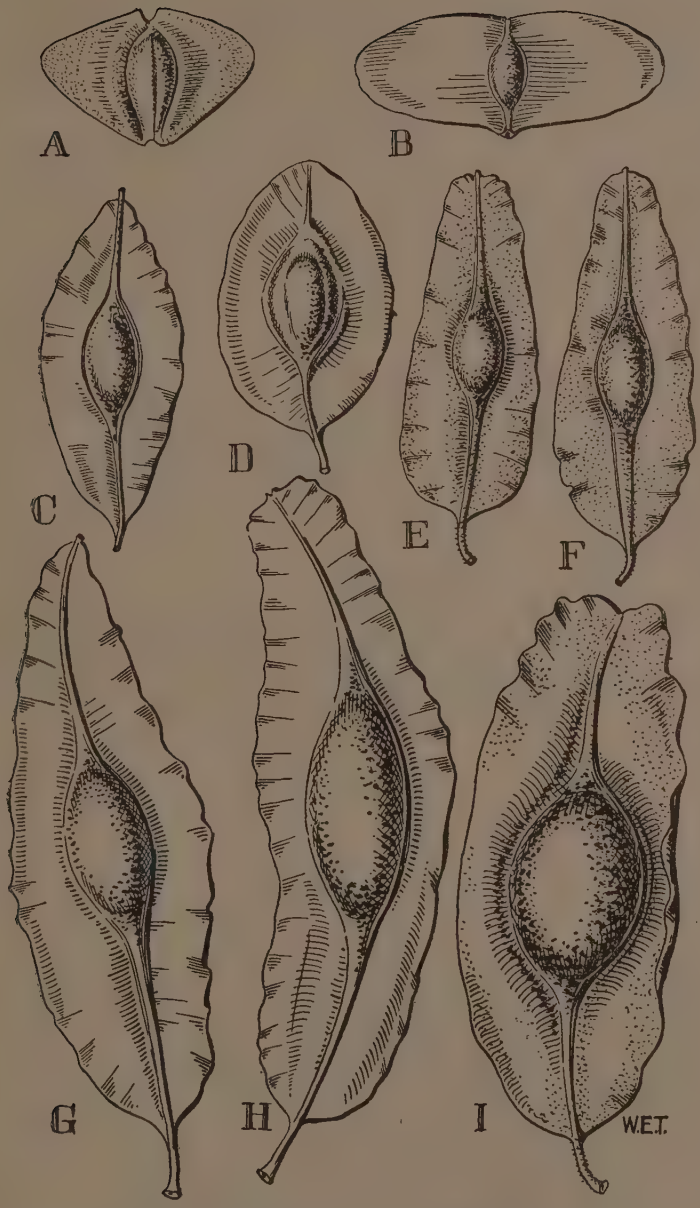

FIG. 96.—FRUITS OF TERMINALIA (COMBRETACEAE).

A, T. scutifera *Planch.* B, T. superba *Engl. & Diels.* C, T. laxiflora *Engl. & Diels.* D, T. Brownii *Fres.* E, T. glaucescens *Planch.* F, T. avicennioides *Guill. & Perr.* G, H, T. macroptera *Guill. & Perr.* I, T. reticulata *Engl.*

2. **Terminalia laxiflora** *Engl. & Diels* Monogr. Afr. Pfl. 4. Combretac. 12, t. 2 B—Chev. Bot. 257. A large tree.
French Sudan: Gourma (July). Dahomey: Atacora Mts. (June). N. Nigeria: Yola (fl. and fr. May)! Katagum (Feb.)! Extends to the Eastern Sudan. Exsicc.—*Dalz.* 91; 391.
3. **T. macroptera** *Guill. & Perr.* Tent. Fl. Seneg. t. 63—F.T.A. 2: 416; Holl. 2: 307; Chev. Bot. 258. *T. Elliotii* Engl. & Diels. *T. adamauensis* Engl. *T. Chevalieri* Diels. A tree, up to about 40 ft., with comparatively large leaves and fruit.
Common in the savannah regions from Senegal to N. Nigeria. Extending to Eastern Sudan and Uganda. Exsicc.—*Sc. Elliot* 5200. *Passarge* 109. *Chev.* 1017. (See Appendix).
4. **T. sokodensis** *Engl.* Bot. Jahrb. 39: 510. A small tree of the open savannah.
Gold Coast: Kratchi! Togo: Sokode-Basari (fr. Nov.)! Exsicc.—*Kersting* 473. *Anderson* 24. (See Appendix).
5. **T. scutifera** *Planch.*—F.T.A. 2: 417; Chev. Bot. 258. A tall straight-boled tree; fruit transversely rhomboid.
Senegal: ? locality! Boulame. French Guinea: Konakry (Feb.). Sierra Leone: Heddle's Farm! Hamilton (Dec.)! Exsicc.—*Afzelius. Heudelot* 907. *Lane-Poole* 87. *Debeaux* 141. (See Appendix).
6. **T. superba** *Engl. & Diels* Monogr. Afr. Pfl. 4. Combretac. 26—Holl. 2: 307. *T. altissima* A. Chev. A lofty tree like the preceding, up to 80–90 ft. or more, with strong buttresses; fruit much broader than long.
In the forests from French Guinea to Cameroons and Angola. N. Nigeria: Lapai, in fringing forest (Dec., Jan.)! Exsicc.—*Lane-Poole* 146; 276. *Chipp* 438; 457. *Johnson* 668; 733. *Yates* 37. *Dodd* 393. *Chev.* 20702. *Preuss* 1300. (See Appendix).

FIG. 97.—ANOGEISSUS SCHIMPERI *Hochst.* (COMBRETACEAE).
A, flower. B, stamen. C, vertical section of ovary. D, fruiting head. E, single fruit showing wings and persistent base of calyx-tube.

7. **T. ivorensis** *A. Chev.* Vég. Util. 5: 152; Bot. 257—Holl. 2: 308, as *Terminalia sp.* A tall straight forest-tree like the two preceding, with buttressed trunk; fruit 3–4 times as long as broad.
French Guinea: between Lola and Nzo (Mar.). Ivory Coast: numerous localities! Gold Coast: Dunkwa (young fr. June)! Tarkwa (May)! S. Nigeria: Ibadan Forest Reserve (May)! Exsicc.—*Chev.* 16153; 22339B. *Chipp* 222. *Vigne* 877. *Punch* 122. (See Appendix).
8. **T. glaucescens** *Planch.*—F.T.A. 2: 416. *T. Passargei* Engl.—Chev. Bot. 258. *T. longipes* Engl. *T. togoensis* Engl. & Diels—Chev. Bot. 258; Holl. 2: 307. *T. Baumannii* Engl. & Diels—Chev. Bot. 257. A tree, 20–30 ft.
Very common in the savannah regions from French Guinea to Ubangi-Shari-Chad, extending southwards to Lower Ivory Coast, S. Nigeria, etc. Exsicc.—*T. Vogel* 178. *Barter* 330; 1074; 1646 (partly). *Thompson* 73. *Elliott* 186. *Chev.* 645; 14695; 22194; 22204; 24089. *Passarge* 110. *Kersting* 322; 639. *Warnecke* 442. (See Appendix).
9. **T. Kerstingii** *Engl.* Bot. Jahrb. 39: 511. A shrub or small tree, with very large reticulate leaves.
Togo: Sokode-Basari, in the savannah (fr. Nov.)! Exsicc.—*Kersting* 476.
10. **T. albida** *Scott Elliot* in Journ. Linn. Soc. Bot. 30: 79. *T. argyrophylla* Engl. & Diels Monogr. Afr. Pfl. 4. Combretac. 15, t. 6 C. *Combretum sericeum* G. Don—F.T.A. 2: 424, not *T. sericea* Burch.; Chev. Bot. 264. A shrub or tree, about 20 ft. high, all parts shining-silky-pubescent.
French Guinea: Kollangui (Mar.)! Futa Jallon (April)! Sierra Leone: on plateau, Buyabuya, Wallia (Mar.)! Worowala (April)! Exsicc.—*Sc. Elliot* 4269. *Smythe* 268. *Lane-Poole* 29. *Chev.* 12869; 12880; 13446.
11. **T. avicennioides** *Guill. & Perr.* Tent. Fl. Seneg. t. 64—F.T.A. 2: 416; Holl. 2: 306; Chev. Bot. 257. *T. Lecardii* Engl. & Diels—Chev. Bot. 257. *T. dictyoneura* Diels. A tree, about 30 ft.; under-surface of leaves, branchlets and inflorescence rusty- or pale-tomentose.
A common savannah-tree throughout the area and occurring also in Lagos Colony and Lower Dahomey. Extending to Abyssinia. Exsicc.—*E. Vogel* 71. *Barter* 1120; 1646 (partly). *Kersting* 32; 321. *Chev.* 23513; 23798. (See Appendix).
12. **T. reticulata** *Engl.* Bot. Jahrb. 39: 511. *T. torulosa* A. Chev. Bot. 258, not of F. Hoffm. A tree of the savannah.
French Guinea: Kollangui (Mar.)! Gold Coast: Abetifi (fr. June)! Jugbwe (April)! Togo: ? locality! Sokode-Basari (fr. Nov.). Extends to Eastern Sudan, Upper Congo and Lakes District. Exsicc.—*Thompson* 85. *Kersting* A196. *Chev.* 12870; 12872 bis.

8. CONOCARPUS Gaertn.—F.T.A. 2 : 417.

A shrub ; branchlets slightly winged, finely appressed-pubescent ; leaves lanceolate, acute at both ends, narrowed to a short winged biglandular petiole, 6–9 cm. long, 2–3·5 cm. broad, glabrous or nearly so, with several pairs of arcuate lateral nerves ; flowers in dense ellipsoid heads, the latter more or less paniculate, about 1·5 cm. long ; petals absent ; fruits densely imbricate, slightly recurved .. .. *erectus*

C. erectus *Jacq.*—F.T.A. 2 : 417 ; Engl. & Diels Monogr. Afr. Pfl. 4. Combretac. 32 ; Chev. Bot. 259. A shrub, about 10 ft., on the seashore and in salt marshes near the coast.
Senegal : ? locality ! Rufisque (Dec.), Carabane (Jan.). Sierra Leone : Freetown (Mar.) ! Sherboro ! Kent ! Bawbaw (Dec.) ! S. Nigeria : Bonny R. (Oct.) ! Exsicc.—*T. Vogel* 164. *Mann* 505. (See Appendix).

9. ANOGEISSUS Wall.—F.T.A. 2 : 417.

Branchlets tomentose ; leaves alternate, ovate-elliptic, obtuse at the base, apex mucronate, 2·5 cm. long, 1·3 cm. broad, at first densely silky, at length laxly pubescent; expanded part of calyx-tube pubescent on both sides .. .. 1. *leiocarpus*
Branchlets shortly pubescent ; leaves lanceolate to ovate-lanceolate, acute at the apex, up to 8 cm. long and 3·5 cm. broad, at length laxly pubescent below ; expanded part of calyx-tube glabrous outside .. .. .. 2. *Schimperi*

1. **A. leiocarpus** *Guill. & Perr.*—F.T.A. 2 : 418, partly ; Chev. Bot. 259, partly. A tree, 30–40 ft.
Mauritania ! Senegal : Lake Guier (Feb., Mar.) ! French Guinea : Kouroussa ! Exsicc.—*Heudelot* (no number). *Chev.* 2869 ; 28698 ; 28780. *Pobéguin* 870.
2. **A. Schimperi** *Hochst.* ex *Hytch. & J. M. Dalz.* in Kew Bull. 1927, ined. *A. leiocarpus* A. Rich. Fl. Abyss. 1 : 269, not of Guill. & Perr.—F.T.A. 2 : 418, partly. A tall tree, reaching about 70 ft., with grey bark and light-green or ashen foliage, often drooping branches, and yellowish flower-heads.
French Sudan : Yatenga (Aug.) ! Senegal : Kita (Aug.) ! Tivaouane (Dec) ! Ivory Coast : Baoulé-Nord, between Fétékro and Tiébissou (July) ! Gold Coast : Turo, Northern Terr. (July) ! Ejura (Aug.) ! Woase, Ashanti (June) ! Krobo Plains (Aug.) ! Anum ! N. Nigeria : abundant in many localities ! S. Nigeria : Oloke Meji ! Ibadan ! Cameroons Mt. : Buea, 3,000 ft. (May) ! Also in French Cameroons to Eastern Sudan and Upper Nile region. Exsicc.—*Elliott* 161 ; 185 ; 199. *Johnson* 1091. *Chipp* 488 ; 738. *Dalz.* 102. *Millen* 111. *Foster* 103. *Mildbraed* 9503. *Chev.* 2155 ; 2156 ; 22188 ; 24800. (See Appendix).

66. RHIZOPHORACEAE

Trees or shrubs, frequently on maritime shores ; branches swollen at the nodes. Leaves opposite and stipulate, rarely alternate and exstipulate, leathery, simple ; stipules interpetiolar, caducous. Flowers hermaphrodite, in axillary inflorescences. Calyx-tube adnate to the ovary or free ; lobes 3–14, persistent, valvate. Petals usually small, often notched, bifid or lacerate, convolute or inflexed in bud. Stamens equal to or usually more than the petals in number, often in pairs opposite the petals on the edge or at the base of a perigynous disk ; anthers 2- or many-celled. Ovary mostly inferior, 2–6-celled or 1-celled by suppression of the septa ; style simple or rarely styles several ; ovules 2 in each cell, rarely more, inserted towards the apex on the inner angle of the cell. Fruit mostly indehiscent, usually 1-seeded or the cells 1-seeded. Seeds with or without fleshy endosperm ; cotyledons terete or connate.

A small family, mainly partial to maritime shores ; leaves usually opposite and with interpetiolar stipules ; flowers small and inconspicuous.

Leaves alternate, exstipulate, with 3–5 longitudinal nerves ; ovary inferior, with 3–4 styles ; flowers small, spicate .. .. 1. **Anisophyllea**
Leaves opposite or whorled, stipulate ; stipules interpetiolar ; style simple :
Flowers in clusters on simple pedicels ; petals laciniate .. .. 2. **Cassipourea**
Flowers in pedunculate cymes ; petals entire or nearly so :
Filaments free, very short ; stipules large and enclosing the young buds ; seed germinating in the fruit on the tree ; calyx glabrous .. .. 3. **Rhizophora**
Filaments united into a long tube ; stipules small ; seed not germinating on the tree ; calyx tomentellous .. .. 4. **Anopyxis**

1. ANISOPHYLLEA R. Br.—F.T.A. 2 : 412.

Leaves cuneate at the base, obliquely ovate or ovate-lanceolate, acutely acuminate, prominently 3–5-nerved, glabrous except when quite young, 8–14 cm. long, 4–6 cm. broad ; axis of inflorescence slightly pubescent ; fruits obovoid, 3 cm. or more long, glabrous .. .. 1. *laurina*
Leaves cordate at the base, ovate-oblong, acutely long-acuminate, 5-nerved at the base, silky-pilose and rose-purplish when young, 6–8 cm. long, 2·5–3 cm. broad ; axis of inflorescence loosely pilose ; fruits not seen .. .. .. 2. *purpurascens*

1. **Anisophyllea laurina** *R.Br.*—F.T.A. 2 : 413 ; Chev. Bot. 256. A tall tree, with a bole reaching 40 ft., and 12 ft. girth. "Monkey Apple."
Senegal : ? locality ! French Guinea : Farana, 3,600 ft. (Mar.) ! Sierra Leone : abundant in various localities (Mar., May, June, Dec.) ! S. Nigeria : Eket ! Udi plateau ! Exsicc.—*Heudelot* 645. *Sc. Elliot* 4154 ; 5118 ; 5365 ; 5864. *Talb.* 3169. (See Appendix).
2. **A. purpurascens** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A tree.
S. Nigeria : Oban ! Exsicc.—*Talb.* (no number).

2. CASSIPOUREA Aubl.—F.T.A. 2 : 410, 411, as *Weihea* Spreng. and *Dactylopetalum* Benth.

Flowers usually few and axillary on the young leafy shoots ; pedicels mostly jointed at the top, or flowers sessile :
Petals more or less pilose or tomentose ; leaves acuminate ; calyx-lobes glabrous or nearly so outside, silky-hairy inside, more or less ovate :
Flowers very numerous at each node, forming a dense cluster ; leaves lanceolate or elliptic-lanceolate, 5–6 cm. long, not more than 3 cm. broad, entire or nearly so 1. *eketensis*
Flowers few at each node, laxly arranged ; leaves broadly oblong or elliptic, rather abruptly acuminate, 7–14 cm. long, 3–6 cm. broad, distinctly toothed 2. *Afzelii*

FIG. 98.—ANOPYXIS EALAENSIS *Sprague* (RHIZOPHORACEAE).

A, flowering branch. B, branch with fruit. C, flower. D, staminal tube opened out. E, anther. F, ovary and style. G, cross-section of ovary.

Petals glabrous ; leaves not acuminate or only very shortly and obtusely so, subentire to rather coarsely toothed, elliptic to oblanceolate, rounded or cuneate at the base, up to 10 cm. long and 5 cm. broad, rather distinctly reticulate below ; stipules ovate-lanceolate, pilose ; calyx-lobes oblong, densely appressed-pilose outside, glabrous inside, 5–6 mm. long .. .. 3. *congoensis*
Flowers very shortly pedicellate, very numerous in dense clusters at the thickened nodes of the older parts of the branchlets ; pedicels jointed near the middle :
Leaves elliptic, rounded or shortly cuneate at the base, shortly acuminate, up to 18 cm. long and 10 cm. broad, subcoriaceous, strongly reticulate, glabrous ; calyx tubular, about 5 mm. long ; ovary tomentose .. .. 4. *Barteri*
Very similar to above, but leaves rather smaller, up to 14 cm. long and 7 cm. broad ; ovary glabrous .. .. 5. *glabra*

1. **C. eketensis** *Bak. f.* in Journ. Bot. 1914 : 3. A shrub or tree, with terete glabrous branches.
S. Nigeria : Eket ! Exsicc.—*Talb.* (no number).
2. **C. Afzelii** *Alston* in Kew Bull. 1925 : 265. *C. caesia* Stapf. *C. parvifolia* Stapf. *Dactylopetalum parvifolium* Scott Elliot. *Weihea Afzelii* Oliv.—F.T.A. 2 : 411. A slender-branched shrub like the preceding, but with larger pale glaucous leaves.
Sierra Leone : near Freetown (Jan.) ! Kambia (Jan.) ! Kennema (Jan.) ! Liberia : Kakatown ! ? locality ! Exsicc.—*Afzelius. Sc. Elliot* 4735. *Smythe* 232. *Whyte. King-Church* 3. *Cook* 72 ; 134. (See Appendix).
3. **C. congoensis** *R. Br.* ex *DC.* Prodr. 3 : 34—Alston l.c. 259. *C. africana* Benth. *Weihea africana* Benth.—F.T.A. 2 : 411. A shrub or small tree, sometimes half-scrambling, glabrous except on the young internodes and leaf- and flower-buds ; flowers few in clusters or solitary.
Senegal : Mbidjem ! French Guinea : Farana (Mar.) ! N. Nigeria : Lokoja (Sept.) ! Nupe ! Guara R. (July) ! Abinsi (April) ! S. Nigeria : Lagos (Mar.) ! Oloke Meji ! Also in Cameroons and Belgian Congo. Exsicc.—*Thierry* 25. *T. Vogel* 206. *Barter* 1670. *Sc. Elliot* 176 ; 5369. *Dalz.* 634. *Foster* 53 ; 281.

4. **Cassipourea Barteri** *N.E.Br.* in Kew Bull. 1894 : 5—Alston l.c. 273. *Dactylopetalum Barteri* Hook. f.—F.T.A. 2 : 412; Chev. Bot. 256. A glabrous shrub or small tree, about 20 ft.; common in sandy soil or near swamps not far from the sea.
Ivory Coast : between Tabou and Berlby (Aug.) ! S. Nigeria : R. Nun ! Bonny (June) ! Lagos (Jan.) ! Lagos Colony (Dec.) ! Eket, mouth of Kwa Ibo R. ! Oni ! Extends to Angola. Exsicc.—*Barter* 2133. *Millen* 63 ; 112. *Dalz.* 1058. *Talb.* 3094. *Chev.* 4312 ; 19981. (See Appendix).
5. **C. glabra** *Alston* l.c. 274. A tree with glabrous dark-brown branches.
S. Nigeria : Oban ! Exsicc.—*Talb.* 1757.

3. RHIZOPHORA Linn.—F.T.A. 2 : 407.

A glabrous tree in maritime swamps ; leaves opposite, oblanceolate to narrowly obovate, obtuse at the apex, subacute at the base, 10–15 cm. long, 4–6 cm. broad, leathery, entire, almost nerveless ; flowers rather numerous in lax shortly pedunculate cymes ; bracteoles supporting the calyx ; calyx-lobes oblong-lanceolate, subacute, leathery, 7–10 mm. long ; petals villous on the margin ; fruit narrowly ovoid, about 4 cm. long ; seed germinating in the fruit, the radicle being exserted about a foot or more before falling .. .. *racemosa*

R. racemosa *G. F. W. Mey.*—F.T.A. 2 : 408. *R. Mangle* Oliv.—F.T.A. 2 : 408, not of Linn.
The Red Mangrove, common in marine and tidal swamps from Senegal to Angola. Also in Eastern tropical America. (See Appendix).

4. ANOPYXIS Pierre ex Engl. in Engl. & Prantl Pflanzenfam., Nachtr. 2 : 49 (1900).

A large tree ; leaves verticillate, oblong to oblong-oblanceolate, rounded at the apex, about 10 cm. long and 3–4 cm. broad, subcoriaceous, glabrous and shining, finely reticulate ; stipules linear ; flowers in short cymes ; calyx softly tomentellous, about 1 cm. long, lobes ovate, obtuse ; petals linear-oblanceolate, pubescent in the upper part, entire or toothed ; fruit narrowly ellipsoid, 3·5 cm. long, 2 cm. in diam., softly tomentellous .. .. *ealaensis*

A. ealaensis *Sprague* in Kew Bull. 1909 : 311. *Pynaertia ealaensis* De Wild. *Anopyxis occidentalis* A. Chev. Bot. 255. A tall tree, up to 100 ft., with bole up to 60 ft. without branches.
Ivory Coast : Dabou (fr. Feb.) ! Gold Coast : Tarkwa (July) ! Nkwanta, W. Apollonia (Aug.) ! S. Nigeria : Eket ! Also in Cameroons and Congo. Exsicc.—*Talb.* 3348. *Chipp* 334. *Chev.* 16209. (See Appendix).

67. HYPERICACEAE

Herbs, shrubs or rarely trees or climbers, with a resinous juice. Leaves opposite or verticillate, simple, entire or glandular-dentate, rarely coriaceous, usually thin and marked with translucent or black dots, rarely small and scale-like ; stipules absent ; indumentum when present often stellate and ferruginous. Flowers terminal or rarely axillary, from solitary to cymose-paniculate or corymbose, usually yellow or white, hermaphrodite, actinomorphic. Sepals 4–5, imbricate. Petals 4–5, hypogynous, imbricate or contorted. Stamens numerous or rarely subdefinite, hypogynous, usually variously united into 3–5 or more bundles, rarely free ; anthers 2-celled, opening by longitudinal slits. Ovary of 3–5 (rarely 1) carpels, 1-celled or imperfectly or perfectly 2–5-celled ; styles the same number as the carpels, slender, free or rarely somewhat united, with a terminal capitate to clavate stigma ; ovules numerous and 2-seriate, or few or solitary. Fruit a septicidal or rarely loculicidal capsule, or a berry or drupe. Seeds without endosperm ; embryo straight or arcuate.

A widely dispersed family ; recognised by the opposite often gland-dotted leaves and the stamens united into bundles.

Petals glabrous on the inside ; fruit a capsule with many seeds ; stamens united into bundles ; herbs, shrubs or rarely trees, with gland-dotted or gland-streaked leaves **1. Hypericum**
Petals glabrous on the inside ; fruit a drupe with a single seed ; stamens united into a tube above ; leaves with numerous closely parallel lateral nerves **2. Endodesmia**
Petals hairy inside ; fruit a berry or drupe ; stamens united into 5 bundles :
Fruit a berry :
Ovules about 5 in each cell ; leaves finely stellate-hairy below .. .. **3. Vismia**
Ovules solitary or paired ; leaves glabrous or softly tomentose below **4. Psorospermum**
Fruit a drupe with 2–4 seeds ; flowers very small, in large terminal cymes ; leaves densely stellate-pubescent below .. .. **5. Haronga**

1. HYPERICUM Linn.—F.T.A. 1 : 154.

Flowers solitary at the ends of short leafy branchlets ; shrub or tree, up to 10 m. high ; branchlets quadrangular ; leaves narrowly lanceolate, acute, 2–2·5 cm. long, with very obscure nerves ; flowers shortly pedicellate, about 5 cm. in diam. ; sepals ovate-

elliptic, about 1 cm. long; petals obovate-oblong, 2–2·5 cm. long; style about 0·5 cm. long with linear branches about 3 mm. long .. .. 1. *lanceolatum*
Flowers in a terminal cyme; shrub about 1 m. high; branchlets subterete; leaves lanceolate, obtuse, 6–7 cm. long, about 2 cm. broad, conspicuously nerved and veined, sparingly gland-dotted; pedicels up to 2 cm. long; sepals ovate, 5–6 mm. long, with black glands towards the margin; petals narrowly oblanceolate, 2·5 cm. long; style nearly entire, about 1 cm. long, stigma subcapitate .. .. 2. *riparium*

1. **Hypericum lanceolatum** *Lam.*—F.T.A. 1 : 156.
Cameroons Mt., 4,000–8,000 ft. (Dec., Jan.)! Fernando Po, 9,000–10,000 ft.! Also in mountain regions of Abyssinia, Uganda, East Africa and the Mascarene Islands. Exsicc.—*Mann* 294; 1199; 2179.
2. **H. riparium** *A. Chev.* in Bull. Soc. Bot. Fr. 54, Mém. 8 : 8; Bot. 49.
French Guinea: Diaguissa, 2,500 ft. (April)! Exsicc.—*Chev.* 13460.
Engler has described (Bot. Jahrb. 40 : 555) a plant from Buea, Cameroons Mt., as *Hypericum peplidifolium* A. Rich. var. *Deistelianum* Engl., which appears to us to be the less glandular form of the common *H. perforatum* Linn., known in Europe as *H. Desetangsii* Lamotte.

FIG. 99.—HYPERICUM LANCEOLATUM *Lam.* (HYPERICACEAE).
A, leaf. B, sepal. C, petal. D, bundle of stamens. E, anther. F, cross-section of ovary.

2. ENDODESMIA Benth.—F.T.A. 1 : 157.

A shrub or small tree; branchlets finely longitudinally lined, glabrous; leaves opposite, oblong-lanceolate, obtusely caudate-acuminate, more or less cuneate at the base, 6–10 cm. long, 2–3 cm. broad, with numerous close parallel lateral nerves, and scattered small blackish glands on the lower surface; petiole 3–4 mm. long; flowers cymose; sepals oblong-lanceolate, acute, shortly united at the base, coriaceous, 5 mm. long, keeled; petals yellow, contorted, about twice as long as the sepals; anthers apiculate; fruits about 1·5 cm. long, on thickened pedicels *calophylloides*

E. calophylloides *Benth.*—F.T.A. 1 : 157.
S. Nigeria: Calabar (July–Aug.)! Cameroons River (June)! Also in French Cameroons and Gabon. Exsicc.—*Mann* 424. *Chev.* 13628.

3. VISMIA Vell.—F.T.A. 1 : 160.

A small tree, up to 15 m. high; leaves and inflorescence clothed with very small stellate hairs; leaves opposite, elliptic or elliptic-lanceolate, acutely acuminate, cuneate at the base, 5–10 cm. long, 2–3 cm. broad, with about 10 pairs of lateral nerves and scattered black glands below; cymes pedunculate, shorter than the leaves; pedicels up to 1 cm. long; sepals 4 mm. long; petals with black lines on the back; fruit a small berry crowned by the persistent styles .. .. *leonensis*

V. leonensis *Hook. f.*—F.T.A. 1 : 161; Chev. Bot. 50.
French Guinea: Konakry (June)! Between the Kaba and the Haut-Mamou (May)! Sierra Leone: numerous localities! Ivory Coast: Sanvi (April); Mt. Gouan, 1,650 ft. (April). S. Nigeria: Aguku! Also in Cameroons. Exsicc.—*T. Vogel* 122. *Mann* 864. *Sc. Elliot* 5591. *Debeaux* 422. *Thomas* 885.
Var. **macrophylla** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. Leaves about 15 cm. long and 5–6 cm. broad, with about 14 pairs of lateral nerves, more rounded at the base than in the type.
Ivory Coast: Baoulé-Sud, Toumodi (fr. Aug.)! Exsicc.—*Chev.* 22384.

4. PSOROSPERMUM Spach—F.T.A. 1 : 158.

Pedicels about 1 cm. long :
Branchlets glabrous ; leaves not punctate or very sparingly so :
Leaves broadly elliptic, subacute, up to 16 cm. long and 10 cm. broad, glossy above, very laxly reticulate and sparsely punctate below, glabrous ; flowers rather numerous in large corymbs .. .. 1. *alternifolium*
Leaves oblanceolate to narrowly elliptic, subacute, 5–8 cm. long, 2–3 cm. broad, glossy above, paler and finely venose-reticulate below, glabrous, not punctate ; flowers rather few in small corymbs ; sepals glabrous .. .. 2. *campestre*
Branchlets softly woolly-tomentose ; leaves rather densely punctate below, ovate-elliptic, obtuse at the apex, 6–8 cm. long, 3·5–4 cm. broad, remaining pubescent on the midrib beneath ; flowers rather numerous, subcorymbose ; sepals glabrous 3. *Kerstingii*

Pedicels usually not more than 0·5 cm. long :
Branchlets, leaves, inflorescence and sepals glabrous or very slightly pubescent only when young :
Leaves very finely and markedly venose-reticulate below :
Inflorescence glabrous ; flowers rather few ; leaves brownish below, not black-dotted below ; further characters as given above .. .. .. 2. *campestre*
Inflorescence glabrous ; flowers rather few ; leaves oblong, 2·5–5 cm. long, about 2 cm. broad, with black dots below .. .. 4. *glaberrimum*
Inflorescence pubescent ; flowers very abundant ; leaves glaucous and finely reticulate below, oblong-oblanceolate, acute at the base, obtuse at the apex, up to 5·5 cm. long and 2 cm. broad ; sepals pubescent when young .. 5. *floribundum*
Leaves not finely venose-reticulate below :
Leaves acuminate, oblong-elliptic, shortly cuneate at the base, 7–10 cm. long, 4–5 cm. broad, glabrous ; sepals glabrous .. .. 6. *tenuifolium*
Leaves at most acute :
Inflorescence about 6–8-flowered, slightly pubescent when young ; leaves obovate, narrowed at the base, 5–7 cm. long, 2–3·5 cm. broad, distinctly punctate below 7. *adamauense*
Inflorescence more than 20-flowered, slightly pubescent when young ; leaves lanceolate-elliptic, obtuse at the base, 10–15 cm. long, 4–6 cm. broad, glaucous-grey beneath, rather sparsely punctate below .. .. .. 8. *suffruticosum*
Branchlets, inflorescence and sepals, and often the leaves softly woolly-pubescent or tomentose :
Leaves glabrous or very nearly so below, or hairy only on the nerves :
Leaves very densely glandular-punctate below, hairy on the nerves, elliptic-lanceolate, acute at both ends, 5–8 cm. long, 2–3·5 cm. broad ; flowers rather few, rusty-tomentose .. .. 9. *densipunctatum*
Leaves laxly glandular-punctate below, becoming glabrous on the nerves below :
Sepals pubescent or tomentose ; branchlets usually softly tomentose :
Leaves very finely and markedly venose-reticulate below, elliptic or obovate, 3–5 cm. long, 1·5–2 cm. broad, slightly pubescent below 10. *Baumannii*
Leaves not markedly reticulate below :
Leaves obovate, acute at each end, 4–6 cm. long, 2–3 cm. broad, glabrous and very slightly punctate below ; petiole over 0·5 cm. long 11. *umbellulatum*
Leaves oblong-lanceolate, equally narrowed at both ends, slightly glaucous below and sparingly punctate, 7–11 cm. long and about 3·5 cm. broad 12. *glaucum*
Sepals glabrous :
Branchlets glabrous ; leaves oblanceolate, acute at both ends, about 10 cm. long and 3·5 cm. broad, glaucous below and rather punctate 13. *laxiflorum*
Branchlets softly tomentose ; leaves ovate-elliptic, cuneate at the base, subacute at the apex, 8–11 cm. long, 3–5 cm. broad, glaucous below and pubescent on the nerves, sparsely punctate .. .. 14. *Thompsonii*
Leaves more or less densely tomentose below :
Leaves sessile or subsessile, mostly with a rounded and often subcordate base, about 7 cm. long and 3·5 cm. broad .. .. 15. *febrifugum*
Leaves distinctly petiolate, mostly subacute at the base, similar in size to above 16. *guineense*

1. **P. alternifolium** *Hook. f.*—F.T.A. 1 : 159 ; Chev. Bot. 50. A shrub or small tree ; on laterite plateaux, etc., appearing soon after the burning of the grass.
French Sudan : Banfara (Mar.) ! Bongouni (April). French Guinea : several localities (Feb., Mar.) ! Sierra Leone : Samu country (Dec.) ! Wossin Highlands ! Scarcies R. (Feb.) ! Makump (July) ! Matotoka (July) ! Kongobu Hill (Mar.) ! S. Nigeria : Lagos Colony ! Exsicc.—*Don. Sc. Elliot* 4239 ; 4774 ; 5051. *Thomas* 44 ; 979 ; 1250.
2. **P. campestre** *Engl.* Bot. Jahrb. 17 : 84. A shrub, about 6 ft. high.
S. Nigeria : Lagos (Dec.) ! Onitsha ! Also in Congo. Exsicc.—*Barter* 1652 ; 1656 ; 2187.
3. **P. Kerstingii** *Engl.* Bot. Jahrb. 55 : 384. A low shrub, with pale rusty branchlets.
Togo : near Misahöhe (April) ! Exsicc.—*Baumann* 568. (See Appendix).

4. **Psorospermum glaberrimum** *Hochr.* in Ann. Conserv. Jard. Bot. Genev. 21 : 63. A glabrous shrub.
Senegal : Exsicc.— *Heudelot* 92.

5. **P. floribundum** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A low shrub.
N. Nigeria : Lokoja, Patti (April) ! Exsicc.— *Elliott* 45.

6. **P. tenuifolium** *Hook. f.*—F.T.A. 1 : 159 ; Chev. Bot. 51, partly. A shrub, 8–10 ft. ; common near the sea and by swamps.
Dahomey : Djougou (May) ! S. Nigeria : Akassa, Nun R. (Aug.) ! Brass ! Calabar ! Lagos (Sept.) ! Also in Cameroons and E. Sudan. Exsicc.— *T. Vogel* 23 ; 43. *Barter* 1865. *Mann* 459. *Thomson* 133. *Dalz.* 989. *Chev.* 23841.

7. **P. adamauense** *Engl.* l.c. 386. A tree, 12–24 ft. ; in sandy bush-country.
Cameroons : Adamawa (June) ! Exsicc.— *Ledermann* 4206 ; 5069.

8. **P. suffruticosum** *Engl.* l.c. 388. *P. Ledermannii* Engl., incl. var. *Doeringii* Engl. An undershrub, up to about 2 ft. high.
Togo : near Agodeka (fl. and fr. May). Cameroons : Adamawa (April, May) ! Exsicc.— *Ledermann* 3367 ; 3694 ; 3836.

9. **P. densipunctatum** *Engl.* l.c. 385. A much-branched shrub, 6–8 ft. high.
Cameroons : Tchape Pass, 4,500 ft. (Mar.) ! Exsicc.— *Ledermann* 2719 ; 2839.

10. **P. Baumannii** *Engl.* l.c. 382. *P. microphyllum* A. Chev. Bot. 51. A shrub, 3–4 ft. high ; branchlets rusty-tomentose when young.
Ivory Coast : Upper Sassandra, top of Mt. Zan, 2,400 ft. (May) ! Toura country, 2,700 ft. (May). Togo : Agome Mts., 2,100 ft. ! Sokode (June). Exsicc.— *Baumann* 22. *Chev.* 21568.

11. **P. umbellulatum** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *P. tenuifolium* A. Chev. Bot. 51, partly, not of Hook. f. A shrub.
French Guinea : Ditinn (April) ! Timbo (Mar.) ! Kouria ! Sierra Leone : ? localities ! Kamakuia (May) ! Exsicc.—*Sc. Elliot* (no number). *Burbridge* 542 ; 545. *Thomas* 267. *Chev.* 12447 ; 12548 ; 12629 ; 12949 ; 18186.

FIG. 100.—PSOROSPERMUM TENUIFOLIUM *Hook. f.* (HYPERICACEAE).
A, flower. B, ovary with styles. C, fruit. D, cross-section of fruit. E, seed. F, embryo. G, bundle of stamens.

12. **P. glaucum** *Engl.* l.c. 387. A small tree, up to 20 ft. ; leaves glaucous and pale-brown below.
N. Nigeria : Keana, Nassarawa (June) ! Cameroons : Banjo, 3,000 ft. (Oct.) ! Dodo (Mar.) ! Exsicc.— *Hepburn* 24. *Ledermann* 2984 ; 5557.

13. **P. laxiflorum** *Engl.* l.c. 385. "Sepals and petals gland-punctate in rows."
Togo : Bismarcksburg (Nov.–Mar.) ! Exsicc.—*Buettner* 431.

14. **P. Thompsonii** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A shrub.
Gold Coast : Drobo, Ashanti (April) ! Kratchi ! Togo : Kpedji (June) ! Exsicc.— *Anderson* 40. *Thompson* 64. *Van Doering* 13.

15. **P febrifugum** *Spach*—F.T.A. 1 : 158 ; Holl. 1 : 61 ; Chev. Bot. 50. A shrub or small tree ; branchlets usually rusty-tomentose when young, sometimes glabrous,.
French Guinea : Diaguissa Plateau (April) ; Ditinn (April). Sierra Leone : Falaba (Mar.) ! Bendembu (April) ! Dahomey : Agouagon (May). N. Nigeria : Bauchi Plateau, 3,000–4,500 ft. ! Widely spread in tropical Africa. Exsicc.—*Don. Sc. Elliot* 5219 ; 5441 ; 5681. (See Appendix).

16. **P. guineense** *Hochr.* in Ann. Conserv. Jard. Bot. Genev. 21 : 57. *P. senegalense* Spach—F.T.A. 1 : 158 ; Chev. Bot. 51. *P. corymbiferum* Hochr. l.c. 58. *P. lanatum* Hochr. l.c. 59. *Vismia guineensis* Guill. & Perr. Tent. Fl. Seneg. t. 23. A common shrub of the savannah.
Senegal : ? locality ! French Guinea : Kollangui (Mar.) ! Kankan ; Dalaba (April) ; Beyla (Mar.) ; Kouroussa (Mar.) ! Sierra Leone : ? locality ! N. Nigeria : Nupe ! Kontagora (Feb.) ! S. Nigeria : Lagos Colony ! Oloke Meji ! Ikode Bere (May) ! Extends to Eastern Sudan. Exsicc.— *Heudelot* 768. *Barter* 1203. *Poéguin* 212.

5. HARONGA Thouars—F.T.A. 1 : 159.

A tree or shrub, with orange-coloured sap, clothed everywhere with fine stellate hairs ; leaves opposite, ovate or ovate-elliptic, acute or shortly acuminate at the apex, rounded at the base, 10–20 cm. long, 6–10 cm. broad, with rather numerous lateral nerves prominent below ; petiole 1·5–2 cm. long ; flowers very small and numerous in a terminal corymbose cyme, its branches covered with coarse rusty indumentum
paniculata

Haronga paniculata *Lodd. H. madagascariensis* Choisy—F.T.A. 1 : 160; Holl. 1 : 62; Chev. Bot. 51. Flowers whitish, fragrant, dotted with black glands; drupes 2–4-seeded. An abundant shrub on old clearings. Common throughout the area, and elsewhere in tropical Africa and the Mascarene Islands.

68. GUTTIFERAE

Trees or shrubs, with resinous juice. Leaves opposite, simple; stipules absent. Flowers actinomorphic, unisexual, polygamous or dioecious, rarely hermaphrodite. Sepals 2–6, rarely more, imbricate. Petals the same number, hypogynous, contorted or imbricate, very rarely subvalvate. Stamens mostly numerous, hypogynous, free or variously united in the lower part or into bundles opposite the petals; anthers 2-celled, opening lengthwise. Rudimentary ovary sometimes present in the male flower; staminodes often present in the female flower. Ovary sessile, superior, 1- to many-celled; ovules 1 to many, on the inner angle of the cells or erect from their base, rarely parietal (*Allanblackia*); stigmas various, sometimes radiating. Fruit dehiscent or not, sometimes large and globose. Seeds often with an aril, without endosperm; embryo large; cotyledons often minute.

A tropical family recognised by the opposite entire leaves without stipules, unisexual flowers with the stamens mostly collected into bundles, imbricate calyx, and resinous juice.

Ovary 1-celled, with numerous ovules on 5 parietal placentas; stamens united into 5 cuneate-spathulate bundles opposite the petals; anthers subsessile; flowers unisexual, large; fruit large, elongate .. .. **1. Allanblackia**

Ovary 2- or more-celled with axile placentas:

Flowers hermaphrodite; ovules 3 or more in each cell:

Flowers large, terminal, solitary; inner sepals nearly as large as the petals; stamens numerous, shortly connate into 5 bundles, the filaments free above; fruit large and ovoid or subglobose .. .. **2. Pentadesma**

Flowers small, umbellate; sepals much smaller than the petals and exposing them in bud; stamens about 15, connate nearly to the anthers in 5 bundles; fruit a small berry .. .. **3. Symphonia**

Flowers hermaphrodite or polygamous; ovary 2-celled with 2 ovules in each cell; stamens numerous, connate only near the base; filaments slender; stigma subsessile, capitate .. .. **4. Ochrocarpus**

Flowers polygamous or dioecious; ovary 2- or more-celled, with a solitary ovule in each cell; stamens free or variously united into bundles; fruits usually rather small; leaves often punctate or with resinous lines oblique to the lateral nerves **5. Garcinia**

1. ALLANBLACKIA Oliv.—F.T.A. 1 : 162.

Leaves oblong-elliptic, rounded at the base, acutely acuminate at the apex, 12–16 cm. long, 5–6 cm. broad, glabrous, with numerous lateral nerves forked near the margin; petiole 1–1·5 cm. long; male flowers crowded towards the apex of the branchlets; pedicels 4–5 cm. long; bundles of stamens shorter than the petals, narrowly spathulate .. .. **1.** *floribunda*

Leaves elliptic to obovate-elliptic, mostly rather acute or cuneate at the base, abruptly acuminate and often twisted at the apex, 12–25 cm. long, 5–7 cm. broad, nervation and petiole as above; male pedicels about 3 cm. long; bundles of stamens as long as or longer than the petals, very broadly spathulate .. .. **2.** *parviflora*

1. **A. floribunda** *Oliv.*—F.T.A. 1 : 163; Chev. Bot. 52. A tree, reaching a height of 80 ft., with a 20-ft. bole and 8-ft. girth; fruit large, sausage-shaped, pendulous, 6–8 in. long.
Dahomey: Sakété (Jan.). S. Nigeria: Ijebu Ode (April)! Benin! Degama (Oct.)! Oban! Cameroons R. (Jan.)! Extends southwards to Gabon. Exsicc.—*Mann* 2193. *Gilman* 521. *King-Church* 47. *Talb.* 3687. (See Appendix).
2. **A. parviflora** *A. Chev.* Vég. Util. 5 : 163; Bot. 53. A tree, up to 100 ft. or more high.
Sierra Leone: Gola Forest! Jama (May)! Ivory Coast: several localities! Gold Coast: Ashanti, Tsifufu (Mar.)! Imbraim (Mar.)! near Tarkwa (May)! Axim (June)! Beyin (July)! Suku (Feb.)! Exsicc.—*Smythe* 48; 261. *Lane-Poole* 98. *Thompson* 20; 38. *Chipp* 225; 251; 263. *Brent* 9DD. *Vigne* 886. *Imp. Inst.* 2321/20. (See Appendix).

2. PENTADESMA Sabine—F.T.A. 1 : 164.

Leaves not gland-dotted below:

A large tree; branchlets slightly angular or ribbed, glabrous; leaves oblong-oblanceolate, cuneate at the base, shortly acuminate and twisted at the apex, 12–24 cm. long, 4–7 cm. broad, with numerous close parallel lateral nerves, with a distinct intramarginal nerve; petiole 1–1·5 cm. long; flowers red; pedicels about 2·5 cm.

long, stout ; sepals very unequal, the inner as large as the petals, up to about 5 cm. long ; ovary gradually narrowed into the elongated style which is divided into 5 linear spreading lobes ; fruits broadly ellipsoid, pointed, about 15 cm. long and 10 cm. broad ; seeds large, with flattened sides .. .. .. 1. *butyracea*

FIG. 101.—ALLANBLACKIA FLORIBUNDA *Oliv.* (GUTTIFERAE).

A, flower with stamens removed. B, bundle of stamens and a lobe of the central disc (rudimentary ovary) in male flower. C, stamens, front and back. D, cross-section of ovary. E, portion of placenta with ovules. F, fruit. G, seed with aril.

FIG. 102.—PENTADESMA BUTYRACEA *Sabine* (GUTTIFERAE).

A, leaves. B, flowers. C, vertical section of ovary. D, anther. E, F, sections of ovary. G, fruit. H, seed.

Very similar to above, but leaves smaller and oblong-obovate, up to about 10 cm. long and 4·5 cm. broad ; flowers white (according to Pierre) .. .. 2. *nigritana*

Leaves gland-dotted below, elongate-oblong, 25–30 cm. long, 7–9·5 cm. broad, very thin, with very numerous lateral nerves ; petioles 1–2 cm. long ; flowers more or less as in *P. butyracea*, but outer sepals less than 3 cm. long .. 3. *grandifolia*

1. **Pentadesma butyracea** *Sabine*—F.T.A. 1 : 164; Holl. 1 : 62; Chev. Bot. 52. *P. Kerstingii* Engl. *P. leucantha* A. Chev. Flowers apparently sometimes white; sepals persistent at the base of the fruit; seeds 3–10, embedded in a yellowish pulp. The yellow latex from the incised bark dries like gamboge.
Forest region from Sierra Leone to Cameroons. Exsicc.—*Don. Kirk. Cole. Barter* 3302. *Mann* 483. *Kersting* 15; 452. *Chev.* 16290; 17669; 21299; 24053; 24169. (See Appendix).
2. **P. nigritana** *Bak. f.* in Cat. Talb. Nig. Pl. 7. Like the last, a tree with glabrous coriaceous leaves.
S. Nigeria: Oban! Also in Gabon. Exsicc.—*Talb.* 1742.
3. **P. grandifolia** *Bak. f.* l.c. 8. A tree, with large oblong leaves.
S. Nigeria: Oban! Exsicc.—*Talb.* 1265.

3. SYMPHONIA Linn. f.—F.T.A. 1 : 163.

A glabrous tree; leaves elliptic-oblanceolate, obtusely acuminate, cuneate at the base, 8–10 cm. long, 2–3 cm. broad, with numerous rather close parallel lateral nerves; petiole about 0·5 cm. long; flowers red to deep crimson, rather densely clustered on short lateral shoots, about 6–7 mm. long; fruits ellipsoid to depressed-globose, about 2·5 cm. in diam.; seeds one or few, large, with flattened sides .. .. *gabonensis*

S. gabonensis *Pierre* in Bull. Soc. Linn. Par. 2 : 1228. *S. globulifera* Oliv.—F.T.A. 1 : 163, not of Linn. f.; Holl. 1 : 62. *S. globulifera* var. *gabonensis* Vesque in DC. Monogr. 8 : 231. A tree, up to 80 ft. high; bole straight, with a crown of short horizontal branches; common in muddy forest-swamps and by streams.
S. Nigeria: Epe! Lagos (Jan.)! Igbessa (Jan.)! Oni! Calabar (Feb.)! Ambas Bay (Feb.)! Also in St. Thomas Island and Gabon. Exsicc.—*Barter* 3255. *Mann* 761; 2279. *Thomson* 70. (See Appendix).
Var. **macrantha** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *S. globulifera* Linn. f. var. *gabonensis* A. Chev. Bot. 52, not of Vesque. Flowers larger than in the type, over 1 cm. long.
Sierra Leone: Falaba (April)! Ivory Coast: Bingerville, Abidjean, Azaguié (June); Dabou (Feb., June); in the coastal forests. Gold Coast: Aburi (July)! S. Nigeria: Oban! Extends to Angola and Uganda. Exsicc.—*Aylmer* 55. *Talb.* 220. *Chev.* 15159; 15596; 16198.

4. OCHROCARPUS Thouars—F.T.A. 1 : 169.

A large tree; leaves oblong-elliptic, shortly cuneate at the base, rather abruptly acuminate, 15–25 cm. long, 6–9 cm. broad, with numerous lateral nerves and reticulate on both surfaces; petiole about 2 cm. long; flowers solitary or few; pedicels about 3 cm. long; calyx closed in bud, opening into 2 or 3 segments about 1·5 cm. long; petals slightly longer than the calyx; fruit globose-obovoid, about 7 cm. or more long, finely warted; seeds 5 cm. long, with fibrous coat .. *africanus*

O. africanus *Oliv.*—F.T.A. 1 : 169; Holl. 1 : 65; Chev. Bot. 55. A tree, 50–100 ft. high; bark often yellow, with pale scales, and with resinous yellow sap; fruit orange-coloured, commonly with 3 large seeds in a yellowish pulp.
Sierra Leone! Ivory Coast: several localities (fl. Oct.–Dec., fr. Feb.–Mar.). Gold Coast: Aburi (July). Dunkwa (Jan.)! S. Nigeria: Ahoada (Sept.)! Also in Princes Isl. Exsicc.—*King-Church* 43. *Vigne* 943. (See Appendix).
Mammea Ebboro Pierre, from Gabon, and *M. Gilletii* De Wild., from the Congo, are probably not specifically distinct from the above.

5. GARCINIA Linn.—F.T.A. 1 : 164.

Branchlets winged or very sharply angled:
Leaves rounded at the base:
Tertiary nerves conspicuous below, more or less parallel; lateral nerves about 12 pairs; leaves oblong-elliptic, shortly acuminate, 15–40 cm. long, 6–20 cm. broad; flowers small, in clusters on very long leafless terminal shoots 1. *nobilis*
Tertiary nerves obscure below; lateral nerves about 8 pairs, spreading, slightly raised below; leaves broadly elliptic, abruptly acuminate, 10–15 cm. long, 6–8 cm. broad, papery, shining on the upper surface; flowers not seen; fruits broadly ellipsoid, acute at each end, about 4 cm. long, 3 cm. broad, closely and strongly verrucose .. .. 2. *granulata*
Leaves cuneate at the base; tertiary nerves and veins obscure below:
Leaves gradually acute, elliptic, 14–15 cm. long, 5–6 cm. broad; veins on the upper surface obscure; axis of the racemes 3–4 cm. long; flowers not seen 3. *gnetoides*
Leaves acuminate, broadly elliptic, about 18 cm. long and 8 cm. broad; veins dense and conspicuous on the upper surface; axis of the racemes about 1 cm. long; pedicels 1–1·5 cm. long; flowers in bud about 0·5 cm. long 4. *densivenia*
Branchlets terete or slightly angular:
Leaves rounded and subcordate at the base, subsessile, oblong-elliptic, shortly acuminate, 15–25 cm. long, 6–10 cm. broad, with about 15 pairs of lateral nerves, laxly reticulate; male flowers in fascicles on the older branchlets; pedicels about 4 cm. long; stamens several, in bundles .. .. 5. *Staudtii*
Leaves usually narrowed at the base, not subcordate:
Leaves in whorls of 3, obovate or elliptic, mucronate, 6–9 cm. long, 4–5·5 cm. broad, with about 9 pairs of lateral nerves equally prominent on both surfaces, with rather prominent intermediate nerves; flowers not seen; fruits solitary, depressed-globose, about 2 cm. in diam., with a smooth shining skin .. 6. *Baikieana*

Leaves in pairs :
Leaves punctate on the lower surface :
Lateral nerves of leaves very numerous and close without intermediate nerves ; leaves oblong-elliptic, caudate and obtusely acuminate, shortly cuneate at the base, 6–10 cm. long, 2–5 cm. broad ; flowers subfasciculate, axillary ; pedicels up to 1 cm. long ; flower-buds about 0·5 cm. long .. .. 7. *punctata*
Lateral nerves with several less prominent secondary nerves :
Leaves rather long-acuminate, distinctly cuneate at the base, broadly elliptic, 10–18 cm. long, 4–7 cm. broad, shining on the lower surface ; flowers not seen ; young fruits subglobose, 8 mm. in diam., pedicel about 8 mm. long 8. *laurifolia*
Leaves rather shortly and gradually acuminate, almost rounded at the base, oblong-elliptic, 8–12 cm. long, 3–5 cm. broad, dull ; flowers not seen ; fruits ellipsoid-globose, about 7 cm. long and 5–6 cm. broad .. 9 *golaensis*
Leaves not punctate, sometimes with lines of resin running obliquely to the lateral nerves :
Lateral nerves very numerous and close, more or less equally prominent, with very inconspicuous or almost absent venation between ; leaves very abruptly caudate-acuminate, elliptic, shortly cuneate at the base, 6–12 cm. long, 3–5 cm. broad ; flowers shortly cymose, axillary ; pedicels about 6 mm. long ; buds depressed-globose, about 5 mm. long .. .. 10. *Mannii*
Lateral nerves not very numerous or close, mostly with distinct secondary nerves or venation between :
Fruits densely verrucose, ellipsoid, 2·5 cm. long, 1·5 cm. broad ; leaves oblong or oblong-elliptic, very shortly and obtusely acuminate, subacute at the base, 9–14 cm. long, 3–6 cm. broad, dull on both surfaces.. .. .. 11. *Elliotii*
Fruits smooth :
Lateral nerves about 10 pairs, with very obscure venation between ; leaves broadly elliptic, at most acute or very shortly acuminate, rounded at the base, 7–13 cm. long, 3–6 cm. broad, shining on the upper surface ; seeds obtusely 3-sided, 3–3·5 cm. long, 1·5 cm. broad .. .. .. 12. *Kola*
Lateral nerves more numerous, with distinct but less conspicuous secondary nerves and veins :
Flowers numerous in fascicles, mostly on the branchlets of one or more years of age ; stamens in 4 bundles ; leaves elongate-elliptic to lanceolate-elliptic, rounded or obtuse at the base, acute or shortly acuminate at the apex, up to 20 cm. long and 11 cm. broad, reticulate on both surfaces ; pedicels up to 2 cm. long ; buds depressed-globose, about 4 mm. long ; young fruit subglobose, smooth, 2 cm. in diam. .. .. .. 13. *polyantha*
Flowers very few together, mostly on the young shoots :
Stamens free or variously unequally united ; leaves elliptic-lanceolate, shortly acuminate, 10–15 cm. long, 4–6 cm. broad, coriaceous, with about 15 pairs of lateral nerves ; pedicels 1 cm. long, up to 2·5 cm. in fruit, the latter depressed-globose .. .. 14. *Barteri*
Stamens in separate bundles :
Flower-buds small, about 3–4 mm. in diam. ; leaves lanceolate or oblong-elliptic, gradually and obtusely acuminate, 10–15 cm. long, rather rigidly coriaceous, with indistinct resinous lines ; pedicels up to 7 mm. long 15. *ovalifolia*
Flower-buds larger, 7–8 mm. in diam. ; leaves obovate, rather abruptly acuminate, about 12 cm. long and 5 cm. broad, bright green when dry, papery, with distinct resinous lines oblique to the nerves ; pedicels nearly 1 cm. long .. .. 16. *brevipedicellata*

1. **Garcinia nobilis** *Engl.* Bot. Jahrb. 40 : 566. A tree, 30–60 ft., with viscid yellow sap and yellowish wood.
S. Nigeria : Oban ! Also in Cameroons. Exsicc.—*Talb.* 1385.
2. **G. granulata** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. Small tree ; fruit green, finely granular-verrucose.
Sierra Leone : Gola (fr. Jan.) ! Exsicc.—*Unwin & Smythe* 58.
3. **G. gnetoides** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *Xanthochymus quadrifarius* A. Chev. Bot. 54, scarcely of Oliv. Branches very sharply winged ; inflorescence (in specimen seen) galled.
Ivory Coast : in the forest ! Exsicc.—*Chev.* 15157.
4. **G. densivenia** *Engl.* Bot. Jahrb. 40 : 563. A tree, 12–18 ft.
S. Nigeria : Oban ! Also in Cameroons. Exsicc.—*Talb.* 229.
5. **G. Staudtii** *Engl.* l.c. 558. A shrub or tree, up to about 40 ft.
S. Nigeria : Oban ! Also in Cameroons. Exsicc.—*Talb.* 1588.
6. **G. Baikieana** *Vesque* in DC. Monogr. 8 : 336—Chev. Bot. 53. *G. Baikieana* var. *togoensis* Engl. A small tree, yielding a yellow juice which hardens like gamboge ; fruit yellow.
French Sudan : Sansanding (Sept.) ; by the Niger, between Dialiba and Langana, Kénégué (Jan.). French Guinea : Farana (Jan.) ! Sierra Leone : boundary towards Farana (Mar.) ! Togo : Possau, Oti R. (Dec.) ! N. Nigeria : Nupe ! Exsicc.—*Barter* 848. *Sc. Elliot* 5338. *Kersting* A 235.
7. **G. punctata** *Oliv.*—F.T.A. 1 : 167. A tree, 15–30 ft.
S. Nigeria : Oban ! Johann-Albrechtshöhe ! Also in French Cameroons, Gabon and Angola. Exsicc. *Talb.* 1336. *Staudt* 446 ; 503
8. **G. laurifolia** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A tree.
Sierra Leone : Ninia, Talla Hills (young fr. Feb.) ! Exsicc.—*Sc. Elliot* 4806.

9. **Garcinia golaensis** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. A medium-sized tree.
Sierra Leone: Gola (fr. Jan.)! Exsicc.—*Unwin & Smythe* 67.

10. **G. Mannii** *Oliv.*—F.T.A. 1 : 167. *G. epunctata* Stapf. *G. antidysenterica* A. Chev. *G. Afzelii* Engl. *G. obanensis* Bak. f. A tree, 30–60 ft., often in damp situations.
Sierra Leone: several localities! Liberia: Since Basin! ? locality! Ivory Coast: several localities! S. Nigeria: Oban! Ambas Bay (Jan.)! Johann-Albrechtshöhe! Also in French Cameroons, Spanish Guinea and Gabon. Exsicc.—*Afzelius*. *Sc. Elliot* 4548; 4841; 5185; 5816. *Mann* 711. *Talb.* 1334; 1591. *Whyte*. *Chev.* 21200; 22412; 22571. *Staudt* 921. *Cook* 87. (See Appendix).

11. **G. Elliotii** *Engl.* Bot. Jahrb. 40 : 571. Fruit 2-seeded, the seed-coat marked with prominent pale branching lines.
Sierra Leone: Makunde; Kassa (Mar.)! Exsicc.—*Sc. Elliot* 5094. *Thomas* 10113. (See Appendix).

12. **G. Kola** *Heckel* in Journ. Pharm. et Chim. 8 : 88—Holl. 1 : 63; A. Chev. Vég. Util. 6 : 441. *G. Conrauana* Engl. *G. Dinklagei* Engl. A tree, reaching 90 ft., with yellow resinous sap; flowering about Jan.–Mar.; fruit reddish-yellow, the size of an orange, with orange-yellow pulp; seed-coat brown with branched lines, the kernels pale and penetrated with pockets of resin.
In the forests from Sierra Leone to Cameroons; up to 3,000 ft. Exsicc.—*Unwin & Smythe* 50. *Dodd. McLeod*. *Talb.* 3809. *Imp. Inst.* 44531. *Dinklage* 1612. (See Appendix).

13. **G. polyantha** *Oliv.*—F.T.A. 1 : 166; Chev. Bot. 54. *G. Chevalieriana* Hochr. A shrub or tree, attaining 70 ft., with thick yellow sap; flowers white or tinged with pink.
French Guinea: Kouria (Oct.)! Diaguissa Plateau, 3,000–4,000 ft. (Oct.)! Sierra Leone: several localities (Feb., April, Oct.)! Ivory Coast: Sanvi, Aboisso (April)! Bingerville! Apollonia (Mar.)! Gold Coast: Ancobra R. (Dec.)! S. Nigeria: Nun R. (Sept.)! ? locality! Fernando Po, 4,000 ft. (Dec.)! Also in Cameroons and Princes Isl. Exsicc.—*Mann* 488; 583. *Sc. Elliot* 4802; 5625; 5883. *Chev.* 15022. (See Appendix).

14. **G. Barteri** *Oliv.*—F.T.A. 1 : 166. *G. Kerstingii* Engl. A shrub or tree; flowers yellowish; fruit 2-seeded, reddish-yellow, edible.
Togo: Sokode (fl. Dec., fr. Mar.); Auae (fr. Jan.). S. Nigeria: Brass! Epe! Lagos Colony! Exsicc.—*Barter* 1830; 3293. *Rowland*. *Kersting* 16; 46; 225. (See Appendix).

15. **G. ovalifolia** *Oliv.*—F.T.A. 1 : 166; Holl. 1 : 65; Chev. Bot. 54. *G. acuminata* A. Chev. A tree, up to about 40 ft., with creamy sap and whitish flowers.
French Guinea: several localities (Jan.–Mar.). Ivory Coast: Soubré (June)! Dahomey: Atacora Mts. (June); Bocorona and vicinity (June). N. Nigeria: Nupe! Kontagora (Dec.)! S. Nigeria: Brass! Exsicc.—*Barter* 31; 807. *Dalz.* 114. *Chev.* 19106; 19184. (See Appendix).

16. **G. brevipedicellata** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *G. Mannii* Oliv. var. *brevipedicellata* Bak. f. A tree, 20–25 ft. high; "centre of flower dark-red; filaments orange; sepals pale-green."
S. Nigeria: Oban! Exsicc.—*Talb.* 1503.

Imperfectly known Species.

G. ? Smeathmannii *Oliv.*—F.T.A. 1 : 168.
Sierra Leone. Exsicc.—*Smeathmann* (not seen).

G. guineensis *Vesque* in DC. Monogr. 8 : 335. *Stalagmites guineensis* G. Don.
Probably equals the preceding.

G. Chevalieri *Engl.* ex *R. E. Fries* in Wiss. Ergebn. Schwed. Rhod.-Kongo-Exped. 1 : 151, name only.
French Guinea. Exsicc.—*Chev.* 15022 (not seen).

69. SCYTOPETALACEAE

Trees; branchlets sometimes winged. Leaves alternate, simple, exstipulate. Flowers hermaphrodite, actinomorphic, in terminal panicles or axillary racemes or fasciculate on the old wood. Calyx cupular, entire or toothed. Petals 3–10, valvate, free or shortly connate. Stamens numerous, in several series on the margin of or on the disk, free or united towards the base; anthers 2-celled, opening by a pore or slit at the side or towards the top. Ovary superior, 3–6-celled; ovules 2 to several in each cell, axile. Fruit woody. Seeds with ruminate or uniform copious endosperm and linear embryo.

A small family confined to tropical West Africa and the Congo region; closely allied to *Tiliaceae*.

Branchlets winged; flowers in long lax axillary panicles .. .. **1. Oubanguia**
Branchlets not winged, at most angular; flowers in very short axillary racemes:
Petals 3; pedicels terete, persistent .. .. **2. Rhaptopetalum**
Petals several to many, connate at the base; pedicels flattened, twisted
3. Scytopetalum

1. OUBANGUIA Baill. in Bull. Soc. Linn. Par. 2 : 869 (1890).

A small tree; branchlets with foliaceous wings, the wings expanded into an obtusely triangular blade below each node; leaves oblong-elliptic, subacute at the base, obtusely long-caudate-acuminate, 18–25 cm. long, 7–8 cm. broad, slightly undulate on the margin, glabrous; lateral nerves about 8 pairs, very prominent below and looped; flowers small, in loose axillary panicles; calyx cupular, 3 mm. long; petals about 6, oblanceolate, about 8–10 mm. long; stamens numerous, connate at the base; fruit oblong, glaucous, about 1·5 cm. long .. .. .. *alata*

O. alata *Bak. f.* in Cat. Talb. Nig. Pl. 15. A tree, about 35 ft. high; petals pink inside, white outside; anthers "bright aureolin."
S. Nigeria: Obutong Road, Oban! Exsicc.—*Talb.* 200; 1513.

2. RHAPTOPETALUM Oliv.—F.T.A. 1 : 351, under *Olacaceae*.

Leaves broadly elliptic, very broadly and obtusely acuminate, 8–12 cm. long, 4–6·5 cm. broad, leathery, with about 5 pairs of opposite or subopposite lateral nerves ; flowers in very short axillary racemes ; pedicels articulating at the top and persisting ; calyx saucer-shaped, 2 mm. long ; petals 3, leathery, about 7 mm. long ; fruit ellipsoid, 2 cm. long .. .. *coriaceum*

R. coriaceum *Oliv.*—F.T.A. 1 : 351. A tree, 30 ft. high ; flowers very small, shortly racemose-fasciculate. S. Nigeria : Calabar ! Fernando Po ! Exsicc.—*Mann* 1443. *Thomson* 40.

3. SCYTOPETALUM Pierre ex Engl. in Engl. & Prantl Pflanzenfam., Nachtr. 244 (1897).

Leaves narrowly oblong-elliptic, acutely cuneate at the base, long-tailed-acuminate, 4·5–9 cm. long, 2–3·5 cm. broad, papery, with about 5 pairs of rather obscure lateral nerves and less prominent secondary ones ; flowers in short axillary racemes ; pedicels flattened and twisted, 3 mm. long ; petals several, connate below, 5–6 mm. long ; fruits ovoid, acute, 2 cm. long, ribbed .. .. *Tieghemii*

FIG. 103.—OUBANGUIA ALATA *Bak. f.* (SCYTOPETALACEAE).

A, flower-bud. B, longitudinal section of bud. C, section of flower. D, fruit. E, cross-section of fruit.

S. Tieghemii *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *Rhaptopetalum Tieghemii* A. Chev. Bot. 122, name only. Small tree, with small buttresses, much-branched ; flowers white, fragrant. Ivory Coast : several localities ! Gold Coast : Tarkwa (fr. Feb.) ! Bawdia (April) ! Exsicc.—*Chev.* 16252. *Thompson* 44. *Vigne* 953.

70. TILIACEAE

Trees or shrubs, very rarely herbs, often clothed with stellate hairs. Leaves usually alternate, simple ; stipules paired or absent. Flowers mostly cymose, actinomorphic, mostly hermaphrodite. Sepals valvate. Petals free or absent, contorted, imbricate or valvate. Stamens usually numerous, free or rarely connate into 5–10 bundles ; anthers 2-celled. Ovary syncarpous or very rarely apocarpous, superior, 2–10-celled ; style usually simple ; ovules on axile placentas. Fruit baccate or drupaceous or variously dehiscent. Seeds sometimes hairy, mostly with copious endosperm and usually straight embryo.

A fairly large family well represented in tropical Africa, readily recognised by the stipulate leaves mostly with stellate hairs, valvate calyx, the numerous free stamens, and 2-celled anthers.

Carpels free, usually 2–5, rarely 1 ; sepals united into a campanulate 3–5-fid calyx ; leaves large, cordate and 7-nerved at the base .. .. .. 1. **Christiana**
Carpels united ; sepals free or nearly so :
Petals not glandular within the base :
Flowers not enclosed in an involucre of bracts :
Trees :
Fruits indehiscent, ribbed ; seeds not winged ; leaves 3-nerved at the base ; flowers few, in terminal or leaf-opposed cymes .. .. .. 2. **Glyphaea**
Fruits indehiscent, woody, not ribbed ; seeds winged ; flowers crowded, in small umbels .. .. 3. **Desplatzia**
Fruits dehiscent, 5-angled, the valves truncate ; seeds winged ; flowers in axillary or terminal cymes .. .. 4. **Cistanthera**
Fruits dehiscent, very prickly ; seeds not winged ; leaves 3-nerved at the base 5. **Ancistrocarpus**
Herbs or undershrubs :
Leaves not tailed at the base ; fruits very prickly ; outer stamens barren ; sepals with gland-tips .. .. 6. **Honckenya**
Leaves often tailed-setose at the base ; fruits smooth ; stamens all fertile 7. **Corchorus**
Flowers enclosed in an involucre of 3 or 4 valvate bracts .. .. 8. **Duboscia**
Petals glandular within the base ; torus more or less elongated :
Fruits indehiscent, not prickly ; trees or shrubs .. .. .. 9. **Grewia**
Fruits mostly dehiscent, prickly ; shrubs or herbs .. .. .. 10. **Triumfetta**

1. CHRISTIANA DC.—F.T.A. 1 : 241.

A tree ; leaves broadly ovate, cordate and 7-nerved at the base, acuminate, about 20 cm. long and 15 cm. broad, entire, stellate-tomentellous below, prominently nerved beneath ; cymes lateral, stalked ; bracts linear, deciduous ; carpels 1–5, free, obovoid, about 1 cm. long, in fruit splitting into 2 boat-shaped valves, tomentose ; seeds marbled .. .. *africana*

C. africana *DC.*—F.T.A. 1 : 241 ; Chev. Bot. 86. A tall tree, with fragrant flowers. Senegal : Casamance, Manpalago (fr. Feb.) ! Sierra Leone : Kambia (fr. Jan.) ! Bafodeya (April) ! Ivory Coast : Mankono (June) ; Anoumaba (fr. Nov.) ! Gold Coast : Nteinseri (June) ! N. Nigeria : Lokoja ! S. Nigeria : Oban ! Also in Shari, Congo, Angola and Eastern Sudan. Exsicc.—*T. Vogel* 200. *Sc. Elliot* 4707. *McAinsh* 911. *Talb.* (no number).

2. GLYPHAEA Hook. f.—F.T.A. 1 : 267.

A tree ; branchlets stellate-puberulous, at length glabrous ; leaves oblong or oblong-obovate, rounded and 3-nerved at the base, caudate-acuminate, denticulate or subentire, nearly glabrous, 7–16 cm. long, 2·5–9 cm. broad, thin ; stipules subulate, small, deciduous ; flowers yellow, few in terminal or leaf-opposed inflorescences ; pedicels up to 1·5 cm. long ; sepals oblong, 1·5–1·75 cm. long, stellate-tomentellous ; petals slightly shorter than the sepals ; fruits spindle-shaped, beaked, longitudinally ribbed, 5–6 cm. long *lateriflora*

G. lateriflora *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined. *Grewia lateriflora* G. Don. *Glyphaea grewioides* Hook. f.—F.T.A. 1 : 267.

Very common throughout the area and widely distributed in tropical Africa. (See Appendix).

FIG. 104.—GLYPHAEA LATERIFLORA *Hutch. & J. M. Dalz.* (TILIACEAE).

A, flower. B, fruit. C, cross-section of fruit. D, longitudinal section of fruit.

3. DESPLATZIA Bocq.—F.T.A. 1 : 266.

A small tree ; leaves elongate-oblong, long-acuminate, somewhat narrowed to a rounded base, 12–25 cm. long, 4–6·5 cm. broad, coarsely and distantly toothed, glabrous and finely reticulate below ; petiole 1–1·3 cm. long, slightly pubescent ; stipules subpersistent, lanceolate, 3 mm. long ; flowers crowded in small umbels ; pedicels 1 cm. long ; sepals linear-lanceolate, 1·2 cm. long, finely tomentellous

lutea

D. lutea *A. Chev.* Bot. 88, name only.
Ivory Coast : Dyola country (April) ! S. Nigeria : Ibadan (Nov.) ! Exsicc.—*Chev.* 21323. *Punch* 50.

4. CISTANTHERA K. Schum.—Engl. Bot. Jahrb. 39 : 577 (1907).

A tree ; leaves ovate-elliptic, acuminate, mucronate, cuneate at the base, up to 11 cm. long and 5 cm. broad, entire, very minutely stellate-puberulous below, at length glabrous ; stipules linear, deciduous ; petiole slender, 1·5–4 cm. long ; flowers few in slender axillary cymes ; peduncle a little longer than the petiole ; sepals ovate-lanceolate, 8–10 mm. long, tomentellous ; petals glabrous, about 1·3 cm. long ;

FIG. 105.—CISTANTHERA PAPAVERIFERA *A. Chev.* (TILIACEAE).

A, flowering shoot. B, stipule. C, flower-bud. D, open flower. E, F, stamens. G, petal. H, gynaecium. I, section of ovary. J, fruiting branch. K, segment of fruit. L, seed.

fruits broadly turbinate, truncate, woody, about 3 cm. long, each valve with 2 blunt horns, stellate-tomentellous ; seeds winged, wings oblique, 1 cm. long *papaverifera*

C. papaverifera *A. Chev.* in Bull. Soc. Bot. Fr. 58, Mém. 8d : 141 ; Bot. 90. A forest-tree with cylindrical bole 40–60 ft. without branches ; flowers yellowish-white, fragrant.
Ivory Coast : Morénou, near Bangouanou (fl. and fr. Nov.) ! Between Anoumaba and Sahoua (Nov.). Bouroukrou (Dec.) ! Zaranou (Mar.) ! Gold Coast : Dunkwa (June) ! Obuasi (Jan.) ! Agogo (fr. Jan.) ! S. Nigeria : ? locality ! Oloke Meji (July). Exsicc.—*Chev.* 16108 ; 16123 ; 16273 ; 22442 ; 22459. *Chipp* 629. *Soward* 666. *Vigne* 893. *Foster* 373. (See Appendix).

5. ANCISTROCARPUS Oliv.—F.T.A. 1 : 265.

Prickles about half as long as the fruit-body ; leaves oblong-elliptic, rounded at the base, acutely acuminate, up to 20 cm. long and 7 cm. broad, serrulate, with about 8 pairs of lateral nerves, 3-nerved at the base ; stamens united in bundles opposite the petals ; fruit globose, 3–4 cm. in diam. including the prickles 1. *densispinosus*
Prickles about a quarter as long as the fruit-body ; otherwise very similar to, and probably only a form of, the above .. .. 2. *brevispinosus*

1. **A. densispinosus** *Oliv.*—F.T.A. 1 : 265. A small tree with long half-scrambling branches; flowers white, turning yellow.
S. Nigeria : Lagos Colony ! Oban ! Cameroons R. (Jan.) ! Johann-Albrechtshöhe ! Also in French Cameroons, Gabon, and Portuguese Congo. Exsicc.—*Lamborn* 264. *Mann* 2204. *Talb.* 7. *Staudt* 671.

2. **A. brevispinosus** *Oliv.*—F.T.A. 1 : 265. A shrub.
S. Nigeria Epe ! Exsicc.—*Barter* 3276

6. HONCKENYA Willd.—F.T.A. 1 : 260.

A small erect shrub ; branches stellate-tomentose ; leaves more or less broadly ovate in outline, rounded or cordate at the base, variously 3–5-lobed or sometimes not lobed, serrate, up to about 13 cm. long and 7 cm. broad, stellate-pubescent or tomentose below ; stipules persistent, lanceolate, about 1 cm. long ; flowers few in terminal leafy racemes ; fruits narrowly oblong, 4–6 cm. long, very bristly, bristles pilose 1. *ficifolia*

A prostrate woody herb ; branches laxly pilose ; leaves mostly 3–5-lobed, 2–5 cm. long, thin, serrate, pilose only on the nerves ; stipules linear-subulate, about 0·5 cm. long ; flowers 2–3 together ; fruits ellipsoid, 2 cm. long, densely bristly, bristles laxly pilose .. .. 2. *minor*

1. **H. ficifolia** *Willd.*—F.T.A. 1 : 260 ; Stapf 583 ; Holl. 1 : 107 ; Chev. Bot. 90. Usually in marshy places ; flowers conspicuous red-purple, rarely white, 2–3 inches in diam. when opened.
Throughout tropical Africa. (See Appendix).
2. **H. minor** *Baill.* Adans. 10 : 183. *H. parva* K. Schum.—Stapf 583 ; Chev. Bot. 90. Flowers white or rose, scarcely 1 inch in diam. ; in dry places.
Sierra Leone : Heddle's Farm (Dec.) ! Panguma ! Yonibana (Nov.) ! Liberia : Monrovia ! Ivory Coast : Alépé (Feb.). Mt. Niénokoué, 1,500 ft. Gold Coast : Axim. Exsicc.—*Sc. Elliot* 3915. *Smythe* 52. *Thomas* 4774 ; 4840 ; 9254. *Chev.* 17378 ; 19490. *Krause.* *Afzelius* (not seen).

7. CORCHORUS Linn.—F.T.A. 1 : 261.

Leaf-blade 0·5–2 cm. long, elliptic or obovate-elliptic, about as long as or shorter than the petiole, without basal hair-like auricles ; prostrate woody perennial in dry regions ; branches tortuous ; flowers solitary or paired ; fruits beaked, breaking into 4 valves, about 2 cm. long, subsessile .. .. 1. *Antichorus*

Leaf-blade much longer than the petiole ; annuals or rarely perennials :

Leaves without basal hair-like auricles, up to 10 cm. long, 0·5–1·5 cm. broad ; fruits shortly beaked, about 1–1·5 cm. long, fasciculate ; valves not septate within 2. *fascicularis*

Leaves usually with basal hair-like auricles :

Capsule with 3 divergent beaks at the apex, the valves not or indistinctly transversely ridged inside :

Leaves ovate or ovate-lanceolate, 3–6 cm. long, 2–3 cm. broad ; pods acutely winged, 1·5–2·5 cm. long, fairly stout .. .. 3. *acutangulus*

Leaves lanceolate or linear-lanceolate, 3–9 cm. long, 1–1·5 cm. broad ; pods faintly ridged, slender, 2·5–3·5 cm. long .. .. 4. *tridens*

Capsule with an entire beak, the valves with distinct transverse ridges inside :

Capsule usually 5-valved, stout, 3–6 cm. long, rather abruptly narrowed to the apex ; leaves lanceolate or ovate-lanceolate, up to 20 cm. long and 7 cm. broad 5. *olitorius*

Capsule usually 3-valved, slender, 3–6 cm. long, gradually narrowed to the apex ; leaves elliptic to oblong-lanceolate, 4–8 cm. long, 1–1·5 cm. broad 6. *tricularis*

1. **C. Antichorus** *Raeuschel*—F.T.A. 1 : 263 ; Chev. Bot. 91. Branches prostrate, a few inches long, from a stout rootstock.
French Sudan : Timbuktu (Aug.). A plant of desert soils from Cape Verde Islands and Teneriffe to Arabia and India, and in Angola. Exsicc.—*Chev.* 3529.
2. **C. fascicularis** *Lam.*—F.T.A. 1 : 263. Annual or sometimes perennial ; branches lax, about 1 ft. long.
Senegal : Walo ! French Guinea : Kouroussa (July) ! N. Nigeria : Katagum ! Extends to Angola and to Nile region and Red Sea ; also in India and Australia. Exsicc.—*Perrottet* 6. *Dalz.* 85. *Poëguin* 332.
3. **C. acutangulus** *Lam.*—F.T.A. 1 : 264 ; Chev. Bot. 90. Annual or perennial, branched, erect or prostrate.
Throughout the area and widely distributed in the tropics. Exsicc.—*Heudelot.* *Debeaux* 313. *T. Vogel* 59 ; 120 ; 162. *Barter* 802. *Sc. Elliot* 5679. *Baumann* 539. *Warnecke* 32.
4. **C. tridens** *Linn.*—F.T.A. 1 : 264 ; Chev. Bot. 91.
A weed of cultivation, throughout the area. Extending to Angola, East Africa and Rhodesia, and Eastern Sudan ; also in India and Australia. Exsicc.—*Perrottet.* *Barter* 935 ; 1747. *Dalz.* 111 ; 1391. *Bunting* 1.
5. **C. olitorius** *Linn.*—F.T.A. 1 : 262 ; Holl. 1 : 114 ; Stapf 583 ; Chev. Bot. 91. A more or less glabrous herb, often woody at the base.
Wild or cultivated throughout the tropics ; also in Australia. One of the plants which yields jute. Exsicc.—*Bové* 315. *T. Vogel* 119. *Sc. Elliot* 4071 ; 5228. *Whyte.* *Dudgeon* 2. *Warnecke* 294.
6. **C. tricularis** *Linn.*—F.T.A. 1 : 262 ; Chev. Bot. 92. Herbaceous or half-woody annual, 1–2 ft.
French Sudan : Kabara (July) ! Faquibine (Sept.) ; Sébi (Aug.). Senegal : Niayes (Dec.). Gold Coast : Krobo Plains (Dec.) ! N. Nigeria : Takwara, 3,200 ft. (May) ! In Cape Verde Islands and throughout Africa, also Arabia, India and Australia. Exsicc.—*Johnson* 495. *Lely* 100.

8. DUBOSCIA Booq.—F.T.A. 1 : 265.

Involucre composed of 3 valvate bracts enclosing 3 flowers ; leaves obliquely ovate or ovate-oblong, rounded or cordate at the base, acutely acuminate, 8–16 cm. long, 4–8 cm. broad, denticulate, prominently 3-nerved at the base, softly stellate-pubescent with a closer felt below ; stipules early deciduous, subulate-lanceolate ; inflorescence leaf-opposed ; peduncle stout, 3·5 cm. long ; fruits woody, 8-ribbed, ellipsoid-globose, 4 cm. long, tomentose .. .. 1. *macrocarpa*

FIG. 106.—DUBOSCIA VIRIDIFLORA *Hutch. & J. M. Dalz.* (TILIACEAE).

A, stipule. B, bracts. C, D, bracteoles. E, petals. F, stamens. G, pistil. H, transverse section of ovary. I, K, partial inflorescences. J, longitudinal section of flower. L, upper surface of leaf. M, lower surface of leaf. N, portion of branchlet.

Involucre composed of 4 valvate bracts enclosing 2 flowers ; leaves ovate or ovate-lanceolate, cordate at the base, acutely acuminate, 8–17 cm. long, 3·5–7 cm. broad, denticulate, 3-nerved at the base, hairy as above ; stipules at length deciduous, linear-lanceolate, 1 cm. long ; inflorescence as above but peduncle more slender and longer ; fruits woody, 6–7-ribbed, 4 cm. long, tomentellous 2. *viridiflora*

1. **Duboscia macrocarpa** *Bocq.*—F.T.A. 1 : 266. A tree, 30 ft. ; young branches stellate-pilose.
Ivory Coast : Middle Comoé, near Assikasso ! S. Nigeria : Oban (Jan.) ! Also in Cameroons and Spanish Guinea. Exsicc.—*Talb.* 1293. *Chev.* 22583.
2. **D. viridiflora** *Hutch & J. M. Dalz.* in Kew Bull. 1927, ined. *Diplanthemum viridiflorum* K. Schum. A tree, up to 50 ft., like the last.
S. Nigeria : Oban ! Victoria (Feb.) ! Also in French Cameroons and Congo. Exsicc.—*Talb.* 1729. *Winkler* 1089.

9. GREWIA Linn.—F.T.A. 1 : 242.

Leaves more or less cordate at the base, very broadly ovate or reniform-orbicular, digitately 5–7-nerved at the base, mostly as broad or nearly as broad as long :
Common peduncle solitary and shorter than the petiole, more or less branched above :
Pedicels slender, about 1·5 cm. long ; stipules linear or filiform, 1 cm. long ; leaves broadly ovate-elliptic, serrulate, up to 15 cm. long and 11 cm. broad, almost scabrid above, softly tomentose below ; cymes with numerous flowers ; buds bristly-tomentose ; fruits with 3–4 almost free carpels, tuberculate 1. *cissoides*
Pedicels very short and stout ; stipules broadly oblanceolate ; leaves reniform or suborbicular, up to 12 cm. broad, denticulate and often lobulate ; tertiary nerves parallel and conspicuous ; flowers few and crowded ; buds densely villous ; fruits depressed-globose, scarcely lobed, tuberculate and pilose .. 2. *villosa*
Common peduncles usually 2–3 in each leaf-axil, longer than the petioles ; leaves very broadly ovate or suborbicular, serrate, up to 12 cm. long and 10 cm. broad, softly tomentose on both surfaces ; stipules narrowly lanceolate, about 1 cm. long ; cymes 3–6-flowered ; buds softly tomentose ; fruits 1–3-lobed, shortly tomentose and pilose .. .. 3. *Barteri*
Leaves at most rounded at the base, ovate to lanceolate, usually much longer than broad :
Lower surface of the leaves completely hidden by the soft felt of hoary indumentum :
Peduncles 1–3 in the leaf-axils, each about 3-flowered :
Leaves distinctly dentate, with prominent lateral nerves on the lower surface ; tertiary nerves numerous, parallel, distinct ; blade oblong-lanceolate or oblong-elliptic, sometimes oblique at the base, 5–10 cm. long, 2–5 cm. broad, with very minute stellate hairs on the upper surface ; sepals nearly 1 cm. long 4. *mollis*
Leaves minutely crenate, with very obscure lateral nerves below ; tertiary nerves scarcely visible ; blade broadly lanceolate, very obtuse or slightly acuminate, 2–5 cm. long, 1–2 cm. broad, glabrous or nearly so above ; sepals up to 8 mm. long 5. *bicolor*
Peduncles repeatedly branched and many-flowered ; leaves oblong-elliptic, rounded at the base, acutely acuminate, more or less undulate, 6–14 cm. long, 2–6 cm. broad, glabrous above ; prominently 3-nerved at the base ; sepals about 5 mm. long ; stipules linear-subulate, early caducous .. .. .. 6. *malacocarpa*
Lower surface of the leaves clearly visible between the more or less laxly arranged stellate hairs :
Flowers solitary ; leaves broadly ovate, apex acute, rounded at the base, dentate, 2–4 cm. long, up to 4 cm. broad, strongly 5-nerved at the base, laxly stellate-pubescent below ; pedicels stellate-tomentose ; sepals linear-lanceolate, 1·5 cm. long ; fruits 3–4-lobed, glabrous .. .. 7. *betulifolia*
Flowers 2 or more together :
Flowers few (2–4) in each inflorescence :
Ovary stipitate above the glandular torus ; leaves oblong-elliptic, rounded at both ends, 2·5–4 cm. long, 1·5–2·5 cm. broad, slightly stellate-pubescent above, shortly so below, closely serrulate ; petiole about 2 mm. long ; peduncle very short ; sepals about 1 cm. long ; ovary villous ; fruit entire, with both long and short pubescence .. .. 8. *Kerstingii*
Ovary sessile above the glandular torus :
Peduncle much shorter than the pedicels :
Leaves fairly densely pubescent below ; flower-buds densely bristly, tomentose ; anthers pubescent ; sepals over 1 cm. long .. .. .. 9. *flavescens*
Leaves very laxly and minutely pubescent below ; flower-buds shortly stellate-pubescent ; anthers glabrous ; sepals about 1 cm. long .. 10. *carpinifolia*
Peduncle longer than the pedicels ; sepals at length about 2·5 cm. long, bristly-pilose and stellate-tomentose ; leaves oblong-ovate, often slightly cuneate at the base :
Leaves acutely acuminate, up to 17 cm. long and 8 cm. broad, denticulate, softly pubescent below ; torus glabrous in the lower half .. 11. *pubescens*

Leaves not acuminate, 7–10 cm. long, 4–5·5 cm. broad, laxly pubescent below; torus tomentose nearly its full length .. .. .. 12. *lasiodiscus*

Flowers numerous in each inflorescence:

Primary bracts pinnately divided; leaves narrowly oblong-elliptic, gradually acuminate, unequal-sided at the base, 12–18 cm. long, 4–5·5 cm. broad, very minutely pubescent below and pilose on the midrib and petiole 13. *oligoneura*

Primary bracts entire or digitately divided to the base:

Primary bracts persistent, digitately divided to the base, with linear-filiform segments; leaves ovate or ovate-elliptic, rather gradually acuminate, rounded at the base, 10–15 cm. long, 5–7 cm. broad, sparingly stellate-pubescent below; petioles shortly stellate-pubescent; fruits spindle-shaped, acute at both ends, 3–3·5 cm. long, with scattered stellate hairs .. 14. *barombiensis*

Primary bracts early caducous, entire:

Leaves stellate-pubescent below, elliptic, subtriangular-acuminate, rounded at the base, 7–13 cm. long, 3–6 cm. broad; petioles bristly-pubescent; fruits obovoid, about 2 cm. long, fibrous .. .. 15. *africana*

Leaves glabrous below, obovate-elliptic, long-caudate-acuminate, rounded or slightly cuneate and 3-nerved at the base, 15–25 cm. long, 6–12 cm. broad; petioles glabrous; flowers rather small, 7–8 mm. long; fruits obovoid, shortly beaked, about 3 cm. long, glabrous .. .. 16. *coriacea*

FIG. 107.—GREWIA VILLOSA *Willd.* (TILIACEAE).

A, flower. B, petal, inner face. C, stamens, front and back. D, ovary with style. E, cross-section of ovary. F, fruits.

1. **Grewia cissoides** *Hutch. & J. M. Dalz.* in Kew Bull. 1927, ined.—Chev. Bot. 87, as *G. herbacea* Hiern. *G. venusta* Mast.—F.T.A. 1: 249, partly, not of Fres. A tomentose shrub (or subherbaceous after burning), with wrinkled leaves and yellow flowers.
French Sudan: near Bama. Dahomey: Djougou! Atacora Mts., 1,500 ft.; Kouandé to Konkobiri; Birni. N. Nigeria: Nupe! Kontagora (Jan.)! Yola (April)! Exsicc.—*Barter* 1662; 3438. *Dalz.* 54; 108. *Chev.* 23851.

2. **G. villosa** *Willd.*—F.T.A. 1: 249; Burret in Engl. Bot. Jahrb. 45: 198; Chev. Bot. 88. A coarse-leaved shrub with yellow flowers, 10–12 ft. high, often on rocky hills.
French Sudan: Sumpi (Aug.). Senegal: Cape Verde, etc.! Gold Coast: Accra! N. Nigeria: Yola (June)! From Cape Verde Islands and Mauritania throughout tropical Africa to Arabia and India. Exsicc.—*Perrottet. Roger. Brown* 415. *Dalz.* 53.

3. **G. Barteri** *Burret* l.c. 186. *G. asiatica* Mast.—F.T.A. 1: 248, not of Linn. A shrub, erect, up to 10–12 ft., or more or less scrambling, with stout densely yellow-tomentose branches.
Togo: Sokode-Basari. N. Nigeria: Nupe! Zungeru (Aug.)! Kontagora (Feb.)! Auchang (Feb.)! Also in Adamawa. Exsicc.—*Barter* 1721. *Elliott* 8. *Dalz.* 110; 344.

4. **G. mollis** *Juss.*—F.T.A. 1: 248; Burret l.c. 174; Chev. Bot. 87. A shrub or small tree, 20 ft.; leaves pale, whitish below; flowers yellow.
Abundant in savannah regions from Sierra Leone and French Sudan to Cameroons. Extending to Eastern Sudan, Uganda and East Africa. Exsicc.—*Barter* 326; 1097. *Sc. Elliot* 5163. *Elliott* 41. *Kersting* A581. *Baumann* 466. *Mildbraed* 7435. *Poéguin* 224.

5. **G. bicolor** *Juss.*—F.T.A. 1: 247, as *G. salviifolia* Heyne; Burret l.c. 176; Chev. Bot. 86. A tree, up to 40 ft.; leaves almost white below.

French Sudan: Gassa to Tacadji! San; Gourma. Senegal: Richard Tol, etc.! Thiès. Dahomey: Abomey. N. Nigeria: Nupe! Mamu, 2,500 ft. (May)! From Mauritania through almost all tropical Africa and extending to Abyssinia and India. Exsicc.—*Roger. Heudelot. Barter* (no number). *Lely* 161.

6. **Grewia malacocarpa** *Mast.*—F.T.A. 1 : 253; Burret l.c. 163; Stapf 583. *G. Schlechteri* K. Schum. *G. dependens* K. Schum. A shrub or small tree, with drooping branches; leaves almost white beneath; fruit about ⅜ inch long, softly short-tomentose.
Sierra Leone: Bagroo R. (April)! Kahreni (April)! Kounoh! Liberia: Kakatown! Sinoe Basin! Togo: Day R. at Cwegbe! N. Nigeria: Lokoja! S. Nigeria: Lagos Colony! Between Ishagama and Ibadan! Near Victoria. Also in French Cameroons and Congo. Exsicc.—*Mann* 820. *Barter* 447. *Rowland. Sc. Elliot* 5582. *Whyte. Baumann* 441. *Schlechter* 12316.

7. **G. betulifolia** *Juss.*—F.T.A. 1 : 246; Burret l.c. 192; Chev. Bot. 88, under *G. populifolia* Vahl. A shrub.
French Sudan: Sumpi. Senegal: Richard Tol! Walo! From Mauritania throughout tropical Africa and to Arabia, Persia and India. Exsicc.—*Roger. Heudelot. De Lessert. Sieber* 30. *Chev.* 3080.

8. **G. Kerstingii** *Burret* l.c. 172—Chev. Bot. 87. A small shrub.
French Sudan: Dialacoro; Darabougou. French Guinea: Kouroussa (Mar.)! Sokode-Basari (fl. and fr. April–July)! Exsicc.—*Kersting* A582. *Pobéguin* 184.

9. **G. flavescens** *Juss.*—F.T.A. 1 : 250, as *G. pilosa* Lam.; Burret l.c. 168; Chev. Bot. 87. *G. guazumifolia* A. Chev. Bot. 87, not of Juss. A shrub.
French Sudan: Ouahigouya. Senegal: Bakel! Richard Tol! Thiès. N. Nigeria: Katagum (Sept.)! Sokoto (Oct.)! From Mauritania throughout tropical Africa to India. Exsicc.—*Heudelot* 283. *Dalz.* 84; 419.

10. **G. carpinifolia** *Juss.*—F.T.A. 1 : 247; Burret l.c. 167, incl. var. *Rowlandii* Burret; Chev. Bot. 87. A shrub or small tree.
Sierra Leone. Gold Coast: several localities! Togo: Lome (fl. and fr. Nov.)! Dahomey: Kotonu (Mar.)! S. Nigeria: Lagos (Mar.)! Ajilite to Addo! Oshogbo (April)! Exsicc.—*Afzelius. Vogel* 67. *Don. Warnecke* 34; 374. *Debeaux* 351. *Mildbraed* 7480.

FIG. 108.—GREWIA PUBESCENS *P. Beauv.* (TILIACEAE).

A, under-surface of leaf. B, vertical section of flower. C, stamens, front and back. D, cross-section of ovary. E, 4-lobed fruit. F, fruit-lobe in vertical section showing 3 chambers.

11. **G. pubescens** *P. Beauv.*—F.T.A. 1 : 250; Burret l.c. 187. *G. tetragastris* R. Br.—F.T.A. 1 : 252; Chev. Bot. 88. *G. lactea* Hochr. *G. gigantiflora* K. Schum. A shrub or small tree, up to 15 ft.; flowers fairly large, pale pinkish or white; fruits 4-lobed.
French Guinea: Futa Jallon, Timbo, &c. Sierra Leone. Ivory Coast: Toumodi (Aug.)! Gold Coast: Cape Coast; Nsawam (Feb.)! Togo: Lomé! Atakpame; Sokode-Basari (common). Dahomey: Zagnanado. S. Nigeria: Abeokuta! Lagos Colony! Oloke Meji! Degema! Oban! Also in Cameroons, Ubangi-Shari and Angola. Exsicc.—*Afzelius* (not seen). *Brass. Irving* 91. *Millen* 47. *Talb.* 1345; 3754. *Warnecke* 469.

12. **G. lasiodiscus** *K. Schum.* in Notizbl. Bot. Gart. Berl. 3 : 100. "Plant 8 ft. high, on laterite plateaux."
Sierra Leone: Sulimania (Mar.)! Exsicc.—*Sc. Elliot* 5277.

13. **G. oligoneura** *Sprague* in Kew Bull. 1909 : 22—Burret l.c. 165. A tree, up to 30 ft.
S. Nigeria: Oban! Fernando Po (Jan.)! Also in Cameroons and Upper Welle region. Exsicc.—*Mann* 210. *Talb.* 1460.

14. **G. barombiensis** *K. Schum.* in Engl. Bot. Jahrb. 15 : 124. *G. africana* Burret l.c. 165, partly, not of Mast.—Chev. Bot. 86. A shrub, up to 15 ft., sometimes scrambling.
Ivory Coast: several localities! S. Nigeria: Ajilite! Oban! Degema! Barombi! Also in French Cameroons and Lower Congo. Exsicc.—*Millen* 171. *Talb.* 1702; 3613; 3793. *Preuss* 385.

15. **G. africana** *Mast.*—F.T.A. 1 : 253; Burret l.c. 165, partly. *G. brunnea* K. Schum. A shrub.
Sierra Leone! Also in Cameroons. Exsicc.—*Don.*

16. **G. coriacea** *Mast.*—F.T.A. 1 : 252; Burret l.c. 162. A shrub or small tree.
S. Nigeria: Oban! Also in Cameroons, Spanish Guinea and Congo. Exsicc.—*Talb.* 1660.

10. TRIUMFETTA Linn.—Sprague & Hutch. in Journ. Linn. Soc. Bot. 39 : 231–276 (1909); F.T.A. 1 : 254.

Sepals lepidote outside ; upper leaves oblanceolate, lower suborbicular and subtrilobed, up to 14 cm. in diam. ; petiolar glands 2–4 on each side ; stamens about 60 ; tubercles of the ovary pilose, terminated by several spinules . . . . . 1. *lepidota*

Sepals not lepidote :

Prickles of the ovary and fruit terminating in several small spines stellately arranged ; fruits globose ; leaves lanceolate or ovate-lanceolate, base subcuneate, acute at the apex, 3–9 cm. long, up to 3·5 cm. broad, serrate, stellate-pilose or tomentose below 2. *dubia*

Prickles of the ovary and fruit terminating in a single straight or curved but not hooked spine :

Prickles slender, dilated only at the base ; leaves mostly undivided, mostly ovate, subcordate at the base, acute, 5–12 cm. long, 2·5–7 cm. broad, tomentose below ; sepals 5–9 mm. long, horn 0·5 mm. long ; stamens 8–10 ; fruit 1–1·5 cm. in diam., prickles pilose or nearly glabrous . . . . . 3. *tomentosa*

Prickles stout, much widened at the base ; leaves very like *T. tomentosa* 4. *Heudelotii*

Prickles terminating in a single hooked or falcate spine :

Fruit ovoid or globose, indehiscent, 4–10 mm. in diam. including the prickles :

Stamens 15 ; fruit globose or subglobose :

Fruit 4–5 mm. in diam. including the prickles, tomentose, the prickles glabrous ; leaves very variable . . . . . 5. *rhomboidea*

Fruit 8–10 mm. in diam. including the prickles, tomentose, the prickles densely pilose ; leaves ovate to lanceolate, undivided or 3-lobed, sharply serrate, setulose with appressed simple hairs on both surfaces ; stamens usually 15 6. *eriophlebia*

Stamens 5–13 ; fruit ovoid, prickles ciliate ; leaves rhomboid-orbicular to hexagonal, broadly cuneate or truncate at the base, acute or subacute, undivided or 3-lobed, coarsely serrate, stellate-pubescent below . . . . . 7. *pentandra*

Fruit globose, dehiscent, 1–1·5 cm. in diam. including the prickles ; stamens 10–12 ; leaves undivided or trilobed or sub-5-lobed . . . . . 8 *cordifolia*

1. **T. lepidota** *K. Schum.*—Sprague & Hutch. in Journ. Linn. Soc. Bot. 39 : 245. *Ancistrocarpus tomentosus* A. Chev. Bot. 92. *Grewia Chevalieri* Gilg. Erect shrub, 3–4 ft. ; flowers yellow.
   Gold Coast : Yeji ! Dahomey : Djougon (June) ! N. Nigeria : Nupe ! Gurara River, Gornapara (Dec.) ! Sokoto Prov. (June) ! Nabardo, 2,300 ft. (May) ! Extends to Eastern Sudan. Exsicc.—*Barter* (no number). *Elliott* 205. *Dalz.* 535. *Lely* 217. *Anderson* 21. *Chev.* 23915.
2. **T. dubia** *De Wild.*—Sprague & Hutch. l.c. 259. An undershrub, 3–4 ft. ; stem stellate-hirsute ; flowers small, yellow.
   French Guinea : Kouroussa (Sept.) ! Togo : Sokode Farm ; mountain savannah near Sokode, 1,200 ft. N. Nigeria : Nupe ! Lokoja, Mt. Patti (Oct.) ! Naraguta (June, Aug.) ! Vom, 3,000–4,500 ft. ! Also in Congo and East Africa. Exsicc.—*Barter* 1550. *Dalz.* 55. *Pobéguin* 450.
   Var. **tomentosa** *Sprague & Hutch.* Leaves more tomentose below.
   Togo : Bismarcksburg, Jegge Stream ! Exsicc.—*Buettner* 194.
3. **T. tomentosa** *Bojer*—Sprague & Hutch. l.c. 260. An undershrub, 2–3 ft., more or less tomentose all over.
   Ivory Coast : Anoumaba, in forest (Nov.) ! N. Nigeria : Naraguta (Aug.) ! Vom, 3,000–4,500 ft. ! Extends to Ubangi and Upper Nile, East Africa and Angola. Exsicc.—*Lely* 511. *Dent Young* 22. *Chev.* 22403.
4. **T. Heudelotii** *Planch.*—Sprague & Hutch. l.c. 261. Like the last, with smaller fruits and stouter prickles.
   Senegal ! Exsicc.—*Heudelot* 681.
5. **T. rhomboidea** *Jacq.*—Sprague & Hutch. l.c. 266 ; Stapf 583 ; Holl. 1 : 106 ; Chev. Bot. 89. A weedy undershrub, variable in habit and foliage.
   Distributed throughout the tropics. (See Appendix).
6. **T. eriophlebia** *Hook. f.* in Fl. Nigrit. 235. *T. rhomboidea* Mast.—F.T.A. 1 : 257, partly, not of Jacq. An erect branched undershrub.
   S. Nigeria : Benin ! New Calabar (Sept.) ! Agolo ! Owhy-Ikure ! Calabar ! Fernando Po (Oct.) ! Exsicc.—*T. Vogel* 9. *Holl.* 145. *Farquhar* 45. *Thomas* 195. *Imp. Inst.* 7 (1906). (See Appendix).
7. **T. pentandra** *A. Rich.* in Guill. & Perr. Tent. Fl. Seneg. 93, t. 19. *T. neglecta* Wight & Arn.—F.T.A. 1 : 255. An erect branched annual, slightly pubescent.
   French Sudan : Djenné (Sept.) ! Senegal : Cape Verde, etc. ! N. Nigeria : Sokoto (Nov.) ! Katagum (Sept.) ! S. Nigeria : Aguku ! Extends to Abyssinia, Ngamiland and S.W. Africa. Exsicc.—*Roger. Dalz.* 83. *Chev.* 3078.
8. **T. cordifolia** *Guill. & Perr.* l.c. 92, t. 18—Sprague & Hutch. l.c. 270, incl. vars. ; Stapf 583 ; Holl. 1 : 106 ; Chev. Bot. 89. A shrub, sometimes up to 12 or 15 ft. high, pubescent, hairy or nearly glabrous, with long-stalked ovate cordate leaves ; fruits ¼ inch across.
   Throughout the area in the coastal and forest regions. Extending to Shari, Congo and Angola. (See Appendix).